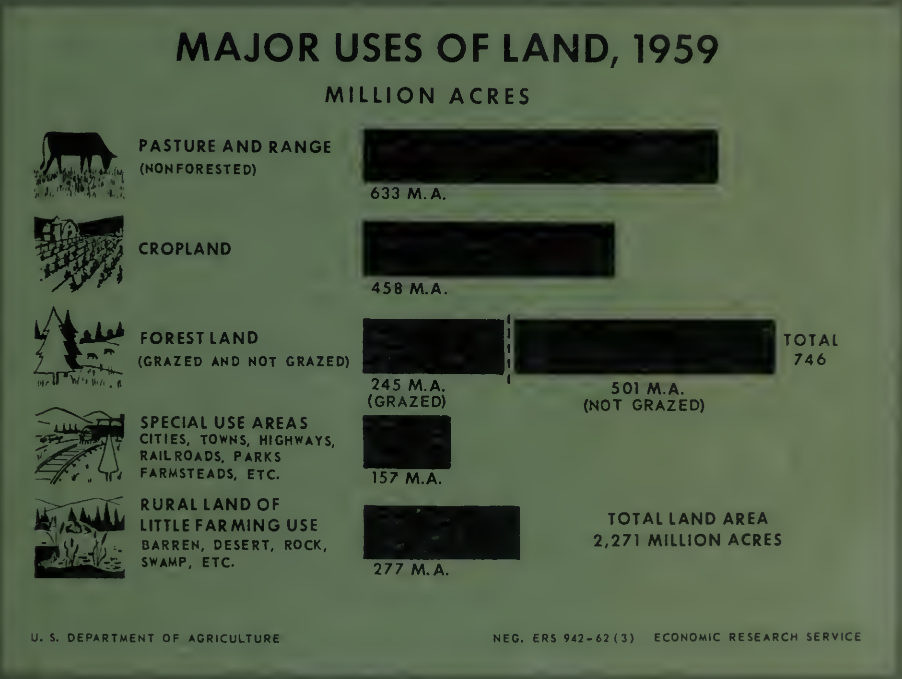
MAJOR USES OF LAND AND WATER in the United States

with Special Reference to Agriculture

Summary for 1959



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SUMMARY

Total area of the 50 States that comprise the United States is 2,314 million acres, of which 2,271 million acres is land and 43 million water. The addition of Alaska and Hawaii as States has greatly enlarged the acreage of the United States. Alaska has increased significantly the land and water areas, forest, rangeland, and waste; Hawaii the tropical crops and rangeland. The rest of the land-and water-use changes are within areas previously inventoried for the 48 contiguous States that resulted largely from changing technology and growing population.

Of the total land area in the 50 States, 20 percent is cultivated cropland, 28 percent grassland pasture and range, 34 percent forest, and the rest, or about 18 percent, other uses. Drainage has improved 25 percent of the cropland and irrigation 7 percent.

Major changes in use of land have occurred in the last 3 decades. For example, 30 million acres or more of poorly adapted cropland have been shifted to forest and pasture, while at the same time an estimated 10 million acres or more of new land have been brought into cultivation. Substituting good land for poor has been important in increasing production.

Planted acreage in 1961 was the smallest since 1930, a peak year for total cropland acreage. Total acreage planted in 1961, including fruits, nuts, and vegetables, was 324 million acres, a reduction of one-eighth from 1930. The biggest reduction since 1930 in acreage has been in grains and cotton. The net difference in total cropland acreage in 1930 and 1961 for the country as a whole does not fully reflect shifts within States and counties. Farming methods together with improved land- and water-use have increased production per acre, so that a much smaller cropland acreage can meet the 1962 demand for farm products. The shift in farm power since 1930 from horses and mules to tractors and trucks alone has released about 60 million acres of cropland, formerly used for feed, to other purposes.

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MAJOR USES OF LAND AND WATER IN THE UNITED STATES

Summary for 1959

by

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THE COUNTRY AS A WHOLE

The broad expanse of land and water of 3,615,211 square miles in the United States is made up of many different kinds and uses. There are the fertile river valleys, forested hills and mountains, and the sandy coastal plains of the East; the timber and woodlands, and the rich Mississippi River Delta of the South; the productive prairie crop and pasture lands of the Central States; the spreading grainfields, and the range and timber areas of the West; the vegetable, sugar, and fruit areas of the South and far West, including Hawaii; the big potential of Alaska; and finally, the land used for great cities, seaports, industrial areas, villages, rural homes, highways, railroads, recreational areas, reservoirs, canals, streams, ponds and lakes, and many other purposes for which land and water are needed. The character of the land and water areas, and the development and use in different regions of the country all vary widely.

Originally about half of the land of the country was covered by forests and another two-fifths by grass and herbaceous plants. The rest - about a tenth - was arid land covered with shrubs, or was barren, desert, rock, and other land.

Today, the area in forest is only two-thirds of the original forest. Areas covered with shrub vegetation have been less subject to change. In some areas, however, shrub-type plants have replaced short grasses and bunch grass and thus have extended the acreage of shrub vegetative cover. Most of the original tall grassland has been converted to cropland and improved pasture. The better lands of the short-grass region farther west are used for irrigated or dry-farm crops and the poorer land for grazing. In comparison with the total land area, only moderate acreages have been irrigated.

LAND USED FOR AGRICULTURE

Cropland and Pasture Resources

The 1959 distribution of cropland, pasture and range was as follows:

	Million acres
Cropland:	
Used for crops only - - - - - - -	392
Rotated between crops and pasture- - - - - - - - - - - - - -	66
Total cropland - - - - - - -	458
Grassland pasture and range - -	633

Thus, if we include all grassland and forest land used for grazing, as well as cropland, 59 percent of the total land area in the 50 States is used directly in crop and livestock production.[1] If all forest land is included, the total used for agriculture is 81 percent.

In addition to the 633 million acres of grassland pasture and range, there are 245 million acres of forest and woodland in the 50 States pastured to some extent in certain seasons. Thus, a total of about 878 million acres are used for pasture and range, exclusive of 66 million acres alternately in pasture and crops. Nearly 30 percent of the pasture and range, or 243 million acres, are federally owned and administered for grazing and other multiple purposes, including forests, wild game, watersheds to supply water for irrigation, power, navigation, domestic, industrial, and other uses. Table 1 and figure 1 show the general distribution of major uses.

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[1] The land area includes all dry land and land temporarily, or partially, covered with water, such as marshland, swamps, and river flood plains, streams, sloughs, estuaries, and canals of less than one-eighth mile in width; and lakes, reservoirs, and ponds having less than 40 acres of area. The water area includes all streams and canals of one-eighth mile and over in width, and lakes, reservoirs, and ponds of 40 acres or more in area. The land and water areas for 1960 were supplied by the U. S. Bureau of the Census.

TABLE 1.--Major uses of land, United States, 1959

Land use	48 contiguous States	Percentage of total	50 States	Percentage of total
	Million acres	Percent	Million acres	Percent
Cropland:				
Cropland used for crops........	358	19	359	16
Soil-improvement crops and idle	33	2	33	1
Cropland used only for pasture.	66	3	66	3
Total cropland[1].............	457	24	458	20
Grassland pasture (excluding cropland pasture).............	630	33	[2] 633	28
Forest land (excluding reserved forest in special uses)[3]......	614	33	746	33
Forest land used for pasture and range...................	(243)	(13)	(245)	(11)
Urban and other built-up areas[4]..	53	3	54	2
Other special-use areas[5]........	86	4	103	5
Miscellaneous other land........	62	3	277	12
Total land area[6]............	1,902	100	2,271	100

[1] Cropland harvested, crop failure, and cultivated summer fallow, soil-improvement crops, idle cropland, and cropland used only for pasture.

[2] Open permanent pasture and range includes 474 million acres non-Federal, and 159 million acres Federal grassland range in the 50 States.

[3] Includes forested grazing land. The grazed areas are shown in parentheses.

[4] Rounding to the nearest million accounts for part of the difference between the totals for the 48 States and 50 States.

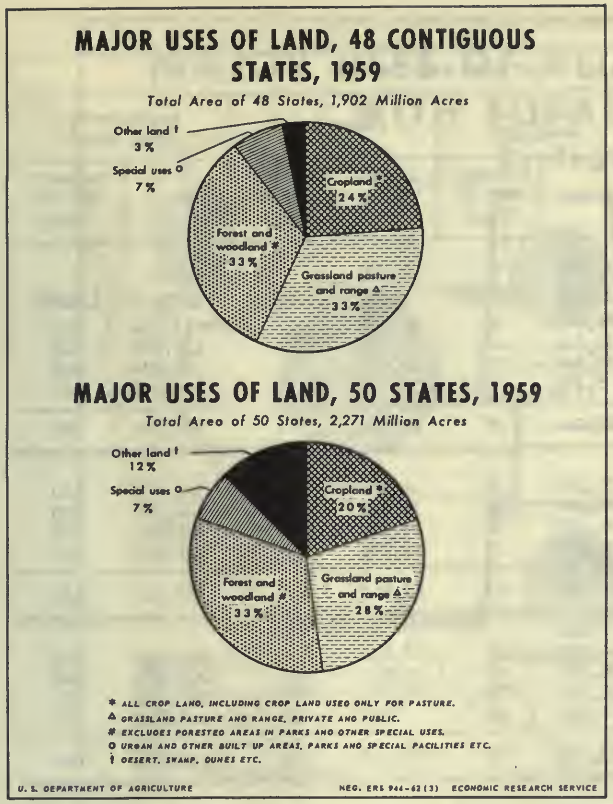
[5] Approximately 25 million acres of reserved forest land in the 48 States and 27 million acres in the 50 States, is in parks, wildlife refuges, and wilderness areas.

[6] Includes streams and canals of less than one-eighth mile in width; and ponds, lakes, and reservoirs of less than 40 acres in area.

The proportion of land in various major uses is different for the 48 contiguous States than for the entire 50 States. For the 48 States, 75 percent of the total land area is used for crops, pasture, and range compared to 60 percent for the 50 States. Alaska and Hawaii add about one-half million acres of cropland, 3 million acres of grassland pasture and range, and 2 million acres of woodland range. Alaska has 50 to 60 million acres of potential range; while cropland and pasture is extensive in Hawaii. The two States, however, add over 134 million acres to the forest area of the country. Much of the increase in forest and other land is attributed to Alaska with its millions of acres of wild and undeveloped northern public-domain land, tundra, barren, and other types of land.

Cropland and Pasture by Regions

Cropland and grassland pasture and range make up from 70 to 90 percent of the land area in the Corn Belt and Northern Plains, with about 45 percent in the Lake States. More than half of the total cropland lies in the 12 North Central States (Corn Belt, Lake States, and Northern Plains Regions). In these States much of the land is comparatively level, soils productive, and climate usually favorable for production of crops. Over 50 percent of the land area of the five Corn Belt States and the four Northern Plains States is used for crops. A third of the land area in the Lake States, is used for crops; a fifth in the other central and eastern regions; and a tenth or less in the Mountain and Pacific States.


MAJOR USES OF LAND, 48 CONTIGUOUS STATES, 1959

Total Area of 48 States, 1,902 Million Acres

MAJOR USES OF LAND, 50 STATES, 1959

Total Area of 50 States, 2,271 Million Acres

* ALL CROP LAND, INCLUDING CROP LAND USED ONLY FOR PASTURE.
△ GRASSLAND PASTURE AND RANGE, PRIVATE AND PUBLIC.
# EXCLUDES FORESTED AREAS IN PARKS AND OTHER SPECIAL USES.
O URBAN AND OTHER BUILT UP AREAS, PARKS AND SPECIAL FACILITIES ETC.
† DESERT, SWAMP, DUNES ETC.

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Figure 1

In the Northeast, Appalachian, Southeast, and Mississippi Delta States, cropland and grassland pasture comprise about 25 to 35 percent of the area. In addition, in the Southern States, about a third of the forest land is grazed at some time during the year. Over 75 percent of the Southern Plains States of Texas and Oklahoma is in cropland and grassland pasture and range. Nearly 60 percent of the land in the eight Mountain States is in grassland pasture and range, with additional areas of forest and woodland grazing. In the Pacific States of California, Oregon, and Washington about 40 percent of the land is in cropland and grassland pasture and range, and 47 percent in forest.

The two Pacific States of Alaska and Hawaii have great variety in land uses. Hawaii has intensively developed cropland areas, with nearly 30 percent of the total land area in cropland and grassland pasture and range, nearly 50 percent in forest, and the rest in other uses.

Alaska has a great expanse of forest and wild land, comprising over 80 percent of the land area. Cropland and grassland pasture and range actively used, potential range and potential cropland and special uses, make up the remaining 20 percent of the land area. Wildlife range and potential range for domestic livestock comprise the greater part of the area now considered as suitable for all types of cropland, pasture, and range (8).[2] The relative areas of cropland and grassland pasture and range for the farm production regions are summarized in table 2 and figure 2.

About 80 percent of the total land in the 48 contiguous States used for grassland pasture and range lies in the Mountain and Plains States. Nearly half of this is in the Mountain States, where three-fifths of the total land area is devoted to this use. Grassland pasture and range occupies over half the land area in the Southern Plains; more than two-fifths in the Northern Plains; one-fourth in the Pacific States; approximately one-eighth in the Corn Belt, and about a tenth or less in most other regions.

The greater part of the forest and woodland suitable for grazing is found in the Southern and Western States. About half of the forest and woodland in these regions is grazed. The Southern and Western States account for 90 percent of the total area in woodland and forest range.

Parts of Hawaii are intensively developed agriculturally and have a great deal of land in field crops, fruits, vegetables, and pasture. In Hawaii, there are 500,000 acres in cropland. Of this acreage, about 40 percent is cropland harvested annually; 30 percent cropland being prepared for crops or growing crops not harvested; and 30 percent cropland pasture. Sugarcane and pineapples are among the important commercial crops in terms of market value. Sugarcane occupies nearly half of the cropland. Only a part of the total acreage, however, is harvested each year as a newly planted crop requires more than 1 year for preparation, planting, and growth. Other crops include vegetables, fruits, coffee, and feed crops. Livestock growing is significant in certain areas naturally adapted to grass and other forage. Hawaii has about 2 million acres of grassland pasture, woodland, and forest range.

Land used for cropland and improved pasture in Alaska at present is limited largely to areas around some of the chief towns, such as Fairbanks and Anchorage, and in the Matanuska Valley. In 1959,

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[2] Numbers underscored in parentheses refer to Literature Cited, p. 29.

TABLE 2.--Major uses of land by regions, United States, 1959

Region	Percentage of total land area in--									
	Cropland[1]		Grassland pasture and range[2]		Forest and woodland[3]		Other land[4]		Approximate land area[5]	
	Total	Percentage of total	Total	Percentage of total	Total	Percentage of total	Total	Percentage of total	Total	Percentage of total
	1,000 acres	Percent	1,000 acres	Percent	1,000 acres	Percent	1,000 acres	Percent	1,000 acres	Percent
Northern:										
Northeast........	20,973	19	7,999	7	66,892	59	16,460	15	112,324	100
Lake States......	45,495	37	8,266	7	54,614	44	14,334	12	122,709	100
Corn Belt........	95,090	57	21,806	13	31,349	19	17,039	11	165,284	100
Northern Plains..	101,054	52	79,743	41	5,377	3	8,703	4	194,877	100
Total..........	262,344	44	117,814	20	158,232	27	56,804	9	595,194	100
Southern:										
Appalachian......	29,990	24	12,984	11	70,202	56	11,374	9	124,550	100
Southeast........	21,071	16	13,939	11	77,860	63	11,198	10	124,068	100
Mississippi Delta	20,808	22	9,358	10	54,170	59	8,354	9	92,690	100
Southern Plains..	53,916	26	109,239	51	38,150	18	11,001	5	212,306	100
Total..........	125,870	23	145,520	26	240,382	43	41,842	8	553,614	100
Western:										
Mountain.........	42,952	8	312,832	57	144,288	26	48,376	9	548,448	100
Pacific..........	26,134	13	53,965	26	96,580	47	27,821	14	204,500	100
Alaska...........	24	(6)	2,350	1	132,314	36	230,793	63	365,481	100
Hawaii...........	500	12	646	16	2,000	49	960	23	4,106	100
Total..........	69,406	6	369,793	33	375,182	33	308,154	28	1,122,535	100
(Total 48 contiguous States)	457,483	24	630,131	33	639,482	34	174,660	9	1,901,756	100
Grand total (50 States).....	458,007	20	633,127	28	773,796	34	406,413	18	2,271,343	100

[1] Includes cropland harvested, crop failure, cultivated summer fallow, soil-improvement crops, cropland temporarily idle, and cropland used only for pasture.

[2] Includes cropland used only for pasture, open permanent pasture in farms (not cropland and not woodland), and grassland range (nonforested grazing land) not in farms.

[3] All woodland and forest areas as reported by the U. S. Forest Service, preliminary table, July 1960, including reserved woodland and forest areas in national and State rural parks and certain other special-use areas. Some nonstocked areas may be duplicated in cropland and pasture areas. Consequently, because of multiple use, some overlaps occur in acreages between forest land, special use, and other areas that were not feasible to eliminate without revision of original statistics on land use from different sources.

[4] Includes urban and town areas, highway and railroad rights-of-way, airports, national and State rural parks, wildlife refuges, wilderness areas, national defense lands, flood-control areas, farmsteads, feed lots, lanes, ditches, farm roads, and miscellaneous areas, such as marshes, open swamps, bare rock, sand dunes, and deserts.

[5] Remeasurement of the land area of the United States for the 1960 Census indicated an approximate land area of 1,902 million acres for the 48 contiguous States and 2,271 million acres for the entire 50 States. Because of multiple use and duplication between forest, special uses, and other areas, the totals of the preceding columns do not always add to the total land area.

[6] Less than one-half of 1 percent.

Alaska had 24,000 acres of cropland, 350,000 acres of grassland pasture, and 2 million acres of nonforest range used for grazing domestic livestock.

Cropland Used for Crops

The acreage of cropland used for crops was 359 million acres in 1959, 355 million in 1960, and 340 million in 1961.[3] From 1949 to 1961, acreage used for crops dropped 47 million acres, or from 387 to 340 million acres. This was the smallest acreage of cropland used since 1913, or in nearly 50 years. Acreage of cropland used for crops decreased in all regions during this period except in the Corn Belt, which had an increase of 1 million acres, and in the Mountain and Pacific Regions. From 1949 to 1961, the decrease in acreage used for crops in the Northeast, Appalachian, Southeast, and Mississippi Delta Regions ranged from 3 to 5 million acres; in the Southern Plains 8 million; in the Northern Plains

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[3] Includes cropland planted (or cropland harvested and crop failure), cultivated summer fallow, or otherwise being prepared for crops. Cropland planted includes fruit orchards, citrus groves, planted nut trees, grapes, small fruits, vegetables and farm gardens, and minor crops.

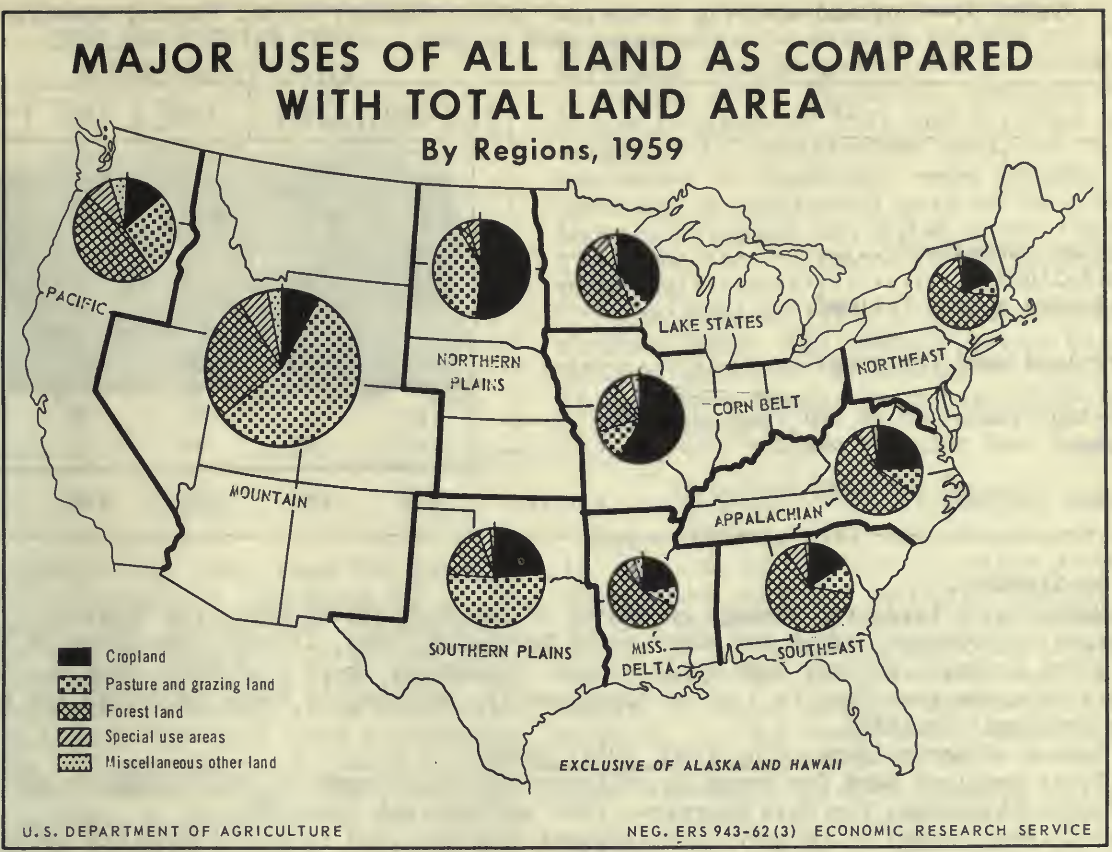

Figure 2

6 million; and in the Lake States 3 million. Table 3 presents data on acreages used for crops, including cropland harvested, crop failure, soil-improvement crops, cropland used for pasture, and total cropland for the United States for specified years 1949 to 1961.

Cropland harvested in 1959 was 317 million acres, in 1960, 317 million acres, and in 1961, 297 million acres. Acreage of cropland harvested declined by 55 million acres, or about 16 percent, between 1949 and 1961. Although total acreage of cropland harvested declined between 1949 and 1961, acreage of irrigated crops increased 6 million acres, or 28 percent. In 1960, 18 percent, or 1 in 5.5 acres harvested, was used to meet export demand. Thus, the bulk of the acreage of cropland harvested, or about 82 percent, was for production for domestic use. Food and feed grains dominated the volume of exports, accounting for over 63 percent of the export acreage; soybeans and cotton ranked next with 32 percent and a wide variety of other crops the remaining 5 percent (20).

From 1959 to 1961, crop production per acre was 27 percent above the 1947-49 average. Grain crops, hay, soybeans, and various other crops had record yields. The increase in crop production more than offset the decline in acreage. All regions had record or near record crop production per acre in 1959 and 1960. Among the chief causes for increased crop production per acre are: (1) Shifts in land use and land-use practices; (2) addition of larger and higher-grade material inputs per acre; and (3) changes in the proportion of intensive and extensive crops produced.

In general, cropland in recent years has been concentrated on the most productive land, both on individual farms and by areas and regions. Average costs and returns per acre from farming poor land as compared to good land has been important in shifting land use. Relative total crop production has not changed significantly even with smaller acreages planted. Acreage-allotment programs, in effect for various years from 1950 to 1961, have expedited shifts in land use and influenced concentration of crops on fertile areas.

TABLE 3.--Cropland used for crops and total cropland, United States, specified years 1949 to 1961

Item	1949	1954	1959	1960	1961[1]
	Mil. acres	Mil. acres	Mil. acres	Mil. acres	Mil. acres
Cropland harvested[2]	352	339	317	317	297
Crop failure[2]	9	13	11	7	12
Cultivated summer fallow[3]	26	28	31	31	31
Cropland used for crops[4]	387	380	359	355	340
Soil-improvement crops and other cropland[5]	22	19	33	38	53
Cropland used only for pasture[3]	69	66	66	[6] 65	65
Total cropland	478	465	458	458	458

[1] Preliminary.

[2] Based on revised crop acreage estimates of the Statistical Reporting Service (23). Acreages of principal crops and minor crops harvested, 1954, 1959-61, are given in table 22. These acreages include some crops double cropped, or where 2 or more crops are harvested from the same land in 1 year. Consequently, acreages of crops harvested are greater than cropland harvested.

[3] Census of Agriculture (16, 1950, 1954, 1959).

[4] Total cropland used for crops is estimated annually based on crop estimates and the agricultural census. For data by years, 1909 to 1961, see table 21.

[5] Soil-improvement crops and other cropland includes land in preparation for crops, newly planted crops, soil-improvement crops, and temporarily idle cropland. The conservation reserve was started in 1957. The conservation reserve was placed chiefly in soil-improvement crops and with possibly some included in summer fallow.

The feed-grain program was authorized in March 1961 for 1 year, but later was extended through 1962. This program was designed to reduce the principal feed-grain acreages and divert such acreages to conservation uses.

[6] From 1960 Land Use Inventory, unpublished data of Farm Economics Division, Economic Research Service, U.S. Department of Agriculture.

Soil-Improvement Crops and Other Cropland

An estimated 53 million acres in 1961 were in soil-improvement crops that were neither harvested nor pastured. Much of the cropland in the Conservation Reserve and Feed Grain Program in 1961 was in soil-improvement crops (table 3).

In 1959, cropland estimates indicated that 10 million acres or more, outside the reserve, were in newly seeded and unharvested crops, being prepared for crops, or idle. In some years, cropland is unused because of physical factors, such as poor soil, insufficient drainage, flooding, lack of water, and weather. Other land is idle because of economic factors, such as costs and returns from farming as compared to income received from nonfarm sources. Near growing cities, much land is idle subject to actual or potential demand for urban development.

The distribution of cropland acreages used for crops for 1909 to 1961 is shown in figure 3 and in appendix table 23.

Effects of the Conservation Reserve and Feed Grain Programs

The total acreage in the Conservation Reserve in 1961 was 28 million acres, or 6 percent of the total cropland acreage. In 1960, the acreage in the reserve was 29 million acres; in 1959, 22 million; in 1958, 27 million; and in 1957, 28 million. The total acreages of cropland harvested and land used for crops decreased after initiation of the Conservation Reserve, but

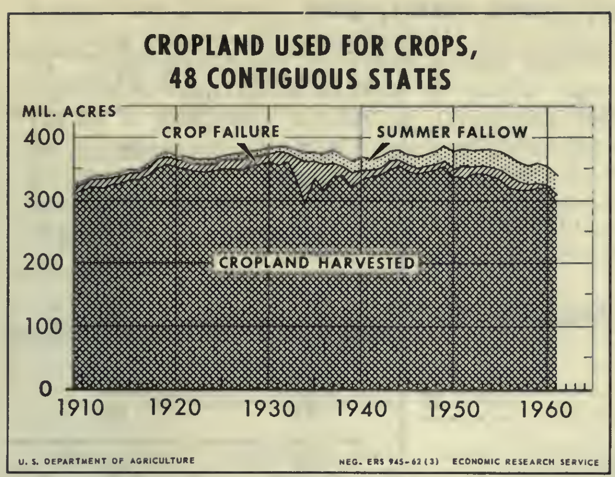

Figure 3

the decrease was less than the acreage placed in the Reserve. (See table 3.)

Not all land put in the conservation reserve was in harvested crops in 1954, 1955, and 1956, and some land apparently was shifted to harvested crops from pasture, idle, and other uses after the reserve program was undertaken. By using land for crops that previously had been partly idle or in pasture, a great deal of land could be put in reserve without reducing the acreage of harvested crops by the full acreage placed in reserve (13, 19).

The conservation reserve was started in 1957. The authority to take additional cropland into the conservation reserve expired with the calendar year 1960. conservation reserve acreage contracts run for different periods, from 3 to 10 years.

About 3 million acres, or 10 percent of total land in the conservation reserve, was planted in forest trees from 1957 to 1961. Most of the remaining acreage was placed in soil-improvement crops not to be harvested or pastured during the period of the contract. A recent survey of expected use of land being released from the conservation reserve contracts, terminating December 31, 1961, shows 44 percent of the 2.5 million acres being released may remain in grass and 56 percent may be cropped in 1962.[4]

In addition to the acreage in the conservation reserve, over 25 million acres were placed in the feed-grain program in 1961. The feed-grain program provided for a 1-year voluntary reduction of the 1961 corn and grain sorghum acreage, 20 to 40 percent below the average of 1959 and 1960 acreages. This program later was extended to include 1962. Producers, who took part in the program in 1961 and diverted such acreages to conservation uses, not to be harvested or pastured, were eligible for payment. A substantial part of the reduction in cropland harvested from 1960 to 1961 may be attributed to the feed-grain program.

From 1954 to 1961, cropland harvested declined from 339 million acres to 297 million acres, or 42 million acres. Most of this was devoted to conservation uses in 1960 and 1961.

Cropland Used for Pasture

From 1954 to 1961, 66 million acres, or 14 percent, of the total cropland acreage were used only for pasture. This is the most productive pasture with estimated yields of 5 to 6 times greater an acre than the average for all grassland pasture and range. Cropland pasture generally is considered in the long-time crop rotation, being plowed, planted in field crops, and then reseeded to pasture every 4 to 8 years.

In addition to cropland used only for pasture, the Census of Agriculture reported 23 million acres of recently improved grassland pasture (16, 1959). Much of this acreage was formerly cropland; a part, improvement of existing pasture; and the rest new land developed by clearing, drainage, and irrigation. The improved pasture acreage is included in the permanent grassland pasture and range acreage of 633 million acres as shown in table 4.

Pasture and Range

Pasture and range acreages by use, cover, and ownership classes are given in table 4 for comparison with cropland acreages in table 3. Nearly all the private and other non-Federal grassland pasture and range acreage--474 million acres--is in farms and ranches. About 60 percent, or 93 million acres, of the 161 million acres of private and other non-Federal forest and woodland pasture and range, is in farms and ranches. Over 92 percent of the 243 million acres of Federal range is used by permit and not included in farms and ranches. The remaining 8 percent, consisting chiefly of scattered areas, is used under lease. Part of the leased acreage is reported in farm and ranch holdings.

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[4] Unpublished data from the Farm Economics Division, Economic Research Service, U. S. Department of Agriculture.

TABLE 4.--Pasture and range, United States, 1959

Pasture and range	48 States	50 States
	Mil. acres	Mil. acres
Grassland pasture and range:		
Private and other non-Federal pasture[1]	473	474
Federal range[2]	157	159
Total grassland pasture and range	630	633
Forest and woodland pasture and range:		
Private and other non-Federal pasture[1]	160	161
Federal range[2]	83	84
Total forest and woodland pasture and range	243	245
Grand total pasture and range[3]	873	878

[1] Non-Federal pasture includes Indian, State, and local government land. From U.S. Department of Agriculture, Conservation Needs Inventory and Land Use Inventory, 1957-59 (unpublished). Excludes wild hayland harvested for hay; includes recently improved pasture.

[2] Federal range usable and available for grazing domestic livestock, compiled from records and reports of principal Federal land management agencies. In addition to the acreage of Federal range given here, Alaska has 50 to 60 million acres of potential range used almost solely by wildlife.

[3] Does not include cropland used only for pasture. This is included in the total cropland acreage.

Most of the Federal land grazed by permit is located in national forests and grazing districts.

Private and other non-Federal pasture and range includes private land, Indian land, and scattered State and local government holdings leased out to farmers and ranchers for grazing. The State and local government land is usually located in, or near, farm areas and closely associated with them in terms of operation and management. Included in this acreage are pastures and grazing land on some institutional farms, such as experiment stations, college farms, hospital, and correctional institution farms. These farms, however, make up only a small percentage of the whole acreage used as cropland, pasture, and range.

Tables 17, 18 and 19 in the appendix present more detailed data on pasture and range land acreages by cover and ownership classes.

Even though the acreage of pasture and range is large, the production of livestock feed from this land represents only slightly more than one-third of the total feed used. About two-thirds of the livestock feed comes from cultivated crops and one-third from pasture. At the top in pasture production per acre is cropland used only for pasture. An average acre of cropland used for pasture produces 5 to 6 times as much as an acre of permanent grassland pasture (private and other non-Federal pasture in farms), and 25 to 30 times the feed from an acre of unimproved woodland pasture and Federal range (not in farms). The production of feed from Federal range is not large compared to the total feed used for livestock. The total Federal range produces only 1.2 percent of all the livestock feed consumed in the United States (11)[5].

The national total of livestock feed from public range, however, does not tell the whole story. A regional view gives a different picture. Most of the Federal range is in the Mountain and Pacific States where about one-eighth of the livestock feed comes from the Federal range. Here the public grazing lands are important (1) as a source of livestock feed in some areas and for ranchers who have access to public land; (2) as a seasonal supply of livestock feed to supplement other sources of feed from private range and cropland; and (3) in terms of joint use of public land for grazing and other purposes.

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[5] Upchurch, M. L. Public Grazing Lands in the Economy of the West. Paper given at meeting of the Amer. Assoc. Adv.Sci.(Sec. 0), Denver, Colo., Dec. 27, 1961. (Mimeographed.)

LAND IN URBAN AND OTHER SPECIAL USES

Special-Use Areas in 1959

Significant changes have taken place in the acreage and number of farms and other land absorbed by urban, industrial, and other developments. Not only has land been shifted to nonfarm uses, but, in addition, land in fringe areas is used well below its full agricultural potential.

The most intensive use classes, urban and rural transportation areas, reflect the increase in town and city population and the consequent expansion of these uses into formerly rural areas. New highways, such as the National System of Interstate and Defense Highways, increase the acreage devoted to transportation in rural areas and frequently attract commercial, industrial, and residential uses into the areas they serve. New airports also occupy substantial areas of land and serve as focal points for other intensive uses.

The grouping of special-purpose uses includes the most, and some of the least, intensively used land in the country. The most highly valued urban land areas are included as well as areas with little market value. Except for land used for farmsteads, farm roads, and farm lanes, these uses are nonagricultural.

Virtually all the acreage in special uses increased between 1950 and 1959. (See Major Uses of Land in the United States (25, table 12; 26, tables 7 and 31) for detailed data on special uses in 1950 and 1954.) Rural transportation areas increased from 24.2 to 25.2 million acres, exhibiting an annual rate of increase of about 110,000 acres. The acreage of land in railroad rights-of-way declined slightly, but increases in highways and airports more than offset the decrease. The estimated acreage in farmsteads, farm roads, and lanes declined as a consequence of the decrease in the number of farms during the 5-year period. Parks and wildlife areas increased in acreage, reflecting in part the growing demands for recreation and the growing willingness of the Federal and State governments to acquire or to set aside land for park facilities and wildlife refuges. Changes in classification to include about 2 million acres in national recreation areas around public reservoirs, formerly excluded because of multiple uses, such as water supply areas for irrigation, power, navigation for flood control, and use for grazing, added substantially to the increase in acreage. Land holdings for other public purposes increased also.

Special-purpose use areas in 1959, shown in table 5, embraced nearly 142 million acres in the 50 States. Of this total, 132 million acres were for nonagricultural uses and 10 million for agricultural. Urban and other built-up areas, including highways, roads, railroads, airports, and State institutional sites, totaled 54 million acres. Extensive-type public facilities, including parks, wildlife refuges, national defense, public industrial, and flood-control lands, comprised 78 million acres. In addition, there were 10 million acres in farmsteads, farm roads, and lanes. Of the total 142 million acres, 13 million were classified as forest land reserved, or set aside for special uses.

Rate of Growth in Special Uses

The average rate of absorption of rural land by urban and other built-up areas, including highways, roads, and airports, from 1950 to 1960, was about 1 million acres a year. Slightly over half of this, or 550,000 acres, are estimated to have gone in to urban use. Highways, roads, airports, and other rural public facilities absorbed the rest, or an estimated 450,000 acres. An additional 1 million acres a year were added to rural parks, wildlife refuges, national defense, water supply, and flood control areas. Thus, a total of 2 million acres of all kinds of rural land were shifted from agriculture, forestry, and general rural uses to special uses.

Areas occupied by cities, towns, highways, roads, industrial plants, airports, rural parks, and other nonagricultural rural facilities increased greatly in the last 50 years - or from 53 million acres in 1910 to approximately 113 million acres in 1959 (table 6). Past trends indicate that more of this land proportionately was obtained from pasture, range, forest, and idle land than from cropland. Exception

TABLE 5.--Special-use areas, United States, estimates for 1959

Special-use area	48 contiguous States	50 States
Nonagricultural:	1,000 acres	1,000 acres
Urban and built-up areas:		
Urban areas	27,121	27,217
Highways and roads	20,407	20,464
Railroads	3,360	3,369
Airports	1,362	1,386
State-owned institutional sites and other uses	1,236	1,236
Total	53,486	53,672
Parks, wildlife refuges, and other extensive facilities:		
National parks	17,047	24,202
State parks	5,513	5,521
Federal wildlife refuges	3,642	11,471
State wildlife refuges[1]	5,745	5,745
National defense areas[2]	22,160	24,421
Flood-control land	4,847	4,848
Federal-industrial lands	1,853	1,853
Total	60,807	78,061
Total nonagricultural lands[2]	114,293	131,733
Agricultural:		
Farmsteads	8,047	8,067
Farm roads and lanes	2,063	2,069
Total agricultural lands	10,110	10,136
Total special-use areas	124,403	141,869

[1] Includes acreage classified as urban or built-up that was not feasible to separate for purpose of this publication.

[2] Excludes about 14.5 million acres in wilderness and 10 million acres of multiple-use forest areas. These areas include land around publicly owned reclamation, flood control, navigation, power reservoirs, and water-supply reservoirs; municipal and county rural parks and other public areas having recreational facilities.

Note: Definitions and procedures are given in footnotes to appendix table 20 showing special-use areas by States.

to this was land used for urban areas, highways, airports, and reservoirs. Of the 2 million acres diverted per year from rural uses from 1950 to 1959, approximately 40 percent was from cropland and grassland pasture, 40 percent from forest, and 20 percent from idle land.

Multiple-Use Recreational Areas

In addition to the total land in special-purpose uses in table 5, there are approximately 25 million acres of publicly owned, multiple-use recreational areas. These areas include the following:

	Million acres
National forest wilderness, primitive and wild land*	14.5
Publicly owned reclamation, power, navigation, flood control, and reservoir	6.1
Municipal and county rural parks	.7
Other public land having recreational facilities	3.0

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*Wilderness, primitive, and wild land areas are included in special-purpose uses in table 1.

TABLE 6.--Urban and other special-use areas, 48 contiguous States, 1910-59[1]

Special-use area	1910	1920	1930	1940	1950	1959
	Mil. acres	Mil. acres	Mil. acres	Mil. acres	Mil. acres	Mil. acres
Urban and other built-up areas[2]......................	29	32	35	37	44	53
Nonurban special-use areas[3].	24	28	30	38	49	60
Total.....................	53	60	65	75	93	113

[1] Approximations 1910 to 1940 based on estimates of specific items from U.S. Census Reports (16, 1910 to 1940); Agriculture Yearbooks (17);National Resource Planning Board Reports (24); and other sources, such as basic unpublished data assembled for these publications. Estimates for 1950 and 1959 are from land use and soil and water conservation needs inventories by the U.S. Department of Agriculture, 1950 to 1960; and urbanized area map measurements and estimates by the 1960 Census.

[2] Urban and other built-up areas include cities and towns, rural highway and road rights-of-way, railroads, airports, and public institutions in rural areas. The 1959 estimates of acreage in urban and other built-up areas are not strictly comparable with estimates for 1950 and 1954 and earlier years because of the changed definition of urban areas used in the 1960 population census.

[3] Nonurban special-use areas include Federal and State parks and other rural parks, recreational areas, wildlife refuges, national defense sites, flood-control areas, and Federal industrial areas. Farmsteads, farm road and lane areas of 10 to 14 million acres for the specified years are not included in this table. The estimates for farmsteads varied in proportion to the number of farms.

Reservoir Areas

As reservoir areas are deducted from the total land area, they are not included among the special uses of land. The water area of reservoirs that were completed between 1950 and 1960 occupied approximately 2.1 million acres and accounts for the decline of about 210,000 acres a year in total land area of the 48 contiguous States during the decade.

In 1959, there were about 9 million acres in the water area of large artificial reservoirs. This does not include the water area in large natural reservoirs and in lakes and ponds not artificially created.

In addition to the large reservoirs (excluded from the land area), there were nearly 7 million acres in water area in small ponds, lakes, reservoirs of less than 40 acres in size, and in small, narrow streams. This acreage was included in the land area. Most of the farm ponds, and the small water supply, power, flood control, and recreational ponds and reservoirs are in this group.

TRENDS IN CROPLAND AND PASTURE ACREAGES

Addition of two new Pacific States--Alaska and Hawaii--in 1958 to the 48 contiguous States, increased the total land area significantly. To compare the trends in land use for the 48 contiguous States and for the 50 States, the data are presented separately.

Land Use Trends in the 48 States

The total cropland acreage in the 48 contiguous States dropped from 478 to 457 million acres, or 21 million acres (4 percent), from 1950 to 1960, and is now at the lowest point since 1910. The acreage of cropland harvested declined still more, or 10 percent from 1950 to 1960. Cropland acreage reached a peak from 1920 to 1930 with 480 million acres. There was a decline of 13 million acres in the late 1930's with regain of 11 million acres in the 1940's.

Cropland acreage, exclusive of cropland used only for pasture, dropped from 409 in 1950 to 391 million acres in 1960, or 4 percent, and is now at the lowest point since 1910. Cropland acreage, exclusive of cropland used only for pasture, reached a peak in 1920 to 1930 with 413 million acres. There was a decrease of 14 million acres in the late 1930's with 10 million acres regained in the war and postwar years of the 1940's.

Acreages of cropland used for pasture, soil improvement crops, cultivated summer fallow, soil bank, and new land development by drainage, irrigation and clearing all contributed to maintenance of the total cropland base. Pasture improvement and development, including seeding of cropland to pasture, accounted for moderate increases in farm grassland pasture in several regions. There were greater proportional changes in cropland acreages used for crops for some regions than for the country as a whole, with decreases generally in the East, increases in the West, and stability in the Central States.

While farm pasture acreage increased, the total grassland pasture and range acreage, including both pasture in farms and range not in farms, was 12 million acres lower in 1959 than in 1930. Much of this change in total grassland pasture was by reversion to forest in the forest regions, and absorption by nonagricultural uses. A considerable amount of interchange between cropland and pasture has occurred in the good land areas. When field crops have been in great demand, cropland has increased and when demand has been low, cropland has tended to decrease with part of the excess acreage going into grassland pasture. The conservation, crop allotment, and soil bank programs have been instrumental in effecting these shifts. Trends in land use are summarized in table 7 and figure 4.

Although the total acreages of cropland, grassland pasture and range have fluctuated up or down by only a few percentage points since 1920, significant changes occurred within and among the major use classes. Foremost among these trends has been a gradual improvement of land for crops and grassland pastures by drainage, flood control, irrigation, and brush clearing. Substantial shifts also have been made between uses in some regions. For example, cropland has been concentrated more and more on the fertile and level land areas,

TABLE 7.--Trends in major land uses, 48 contiguous States, 1900-1959

Land use	1900	1910	1920	1930	1940	1950	1959
	Mil. acres	Mil. acres	Mil. acres	Mil. acres	Mil. acres	Mil. acres	Mil. acres
Cropland[1].........................	389	431	480	480	467	478	457
Available pasture and range (nonforested)[2].................	761	693	652	652	650	631	630
Forest and woodland[3]..............	600	600	602	601	608	612	614
Other land[4].......................	153	179	169	170	180	183	201
Total[5].......................	1,903	1,903	1,903	1,903	1,905	1,904	1,902

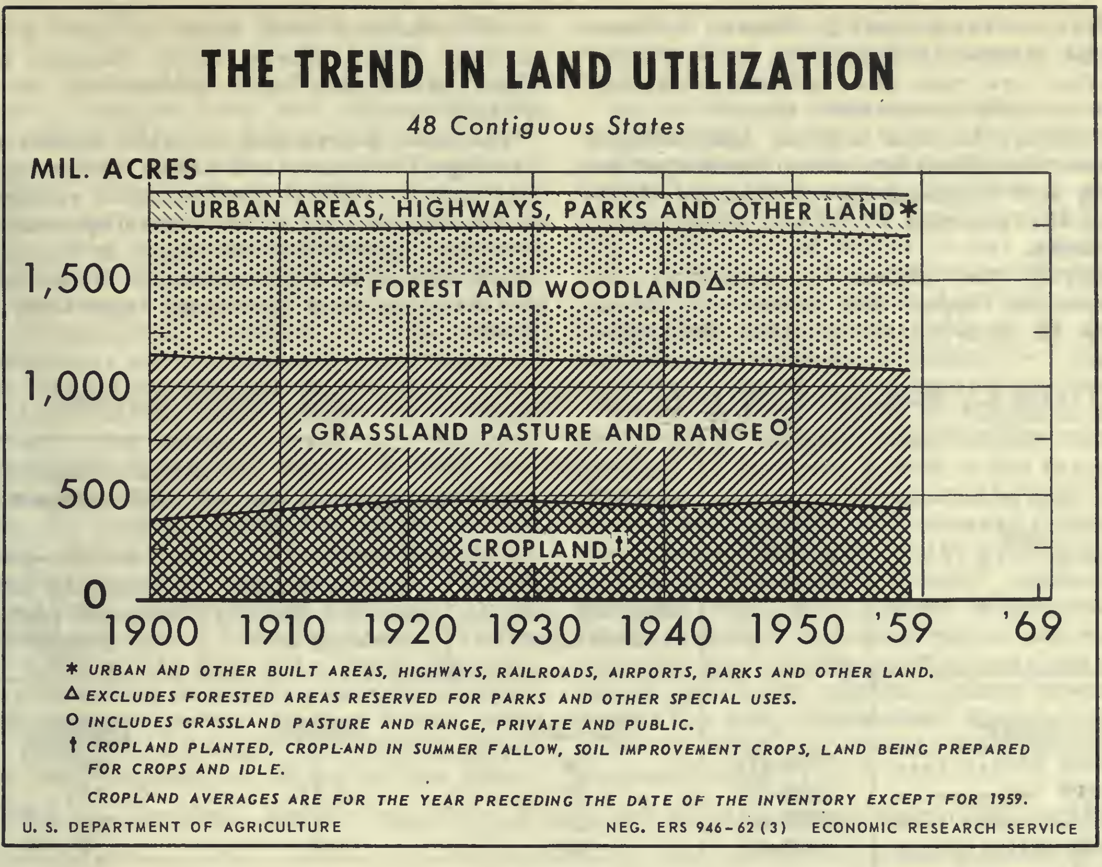
[1] Cropland harvested, crop failure, cropland idle or fallow, and cropland used only for pasture. Cropland and pasture use relates to the preceding years, except for 1959, where they are for the current year.

[2] Grassland pasture and other nonforest grazing land. Includes idle grassland which probably existed in significant acreages only before 1920.

[3] Exclusive of reserved forest land in parks, wildlife refuges, other special-use areas, etc. Includes forest land and woodland grazed.

[4] Includes special land uses, such as urban areas, highways and roads, farmsteads, parks, wildlife refuges and military reservations, and also land having slight surface-use value except for wildlife, watershed protection, and recreation (desert, rock, sand dunes, etc.). Special-use areas totaled about 142 million acres in 1959; and other land 59 million acres.

[5] Remeasurement of the land area of the 48 contiguous States in connection with the 1960 Census indicated an approximate land area of 1,902 million acres. Decreases since 1940 chiefly represent increases in water area of reservoirs.


THE TREND IN LAND UTILIZATION

48 Contiguous States

* URBAN AND OTHER BUILT AREAS, HIGHWAYS, RAILROADS, AIRPORTS, PARKS AND OTHER LAND.

△ EXCLUDES FORESTED AREAS RESERVED FOR PARKS AND OTHER SPECIAL USES.

○ INCLUDES GRASSLAND PASTURE AND RANGE, PRIVATE AND PUBLIC.

† CROPLAND PLANTED, CROPLAND IN SUMMER FALLOW, SOIL IMPROVEMENT CROPS, LAND BEING PREPARED FOR CROPS AND IDLE.

CROPLAND AVERAGES ARE FOR THE YEAR PRECEDING THE DATE OF THE INVENTORY EXCEPT FOR 1959.

U. S. DEPARTMENT OF AGRICULTURE NEG. ERS 946-62 (3) ECONOMIC RESEARCH SERVICE

Figure 4

while hilly and eroded land has been shifted to grass and trees. Shift of field crops to the better soil areas has increased average yields per acre.

Considerable land improvement and development was carried out from 1950 to 1960, much of it on existing cropland and pasture. Such work included land forming, drainage, irrigation, and clearing, but most land improvement was on cropland and pasture already in use. Yields and ease of cultivation were improved materially by land improvement.

An estimated 10 percent of the agricultural counties in the 48 contiguous States had significant increases in cropland acreage from 1950 to 1960. These increases usually were more than offset, however, by decreases in other counties, often in the same State or general region. This frequently has meant improvement and development of good land and retirement of poor land, and shifts to noncropland and pasture uses within the same State and many times within the same county.

At present, development of new cropland and pasture probably does not equal shifts to other uses. The acreage classified as forest land in 1959 is considerably larger than the acreage in 1930. Urban and other built-up areas and land used for parks, recreation, and other special uses also had significant additions between 1930 and 1959.

Consequently, because of these opposing forces, land improvement on the one hand, land retirement and shifts to other uses on the other, only 12 of the 48 contiguous States showed significant increases in cropland from 1950 to 1959. Nine of these States were in the West and three in the Corn Belt. Several other States had little change, but a number of Northeastern and Southeastern States lost cropland acreage.

Examples of Shifts in Land Use

Striking changes in use of agricultural land in the Eastern States have taken place in the last 20 years (1, 6). During this period, use of farmland remaining in production has changed in many areas. Some areas previously in production have shifted to urban, industrial, recreational, and other nonfarm use. In others, the less favorable areas formerly in agricultural production are now idle and are reverting or have already reverted to forest.

In contrast to this loss of agricultural land, new farmland has been developed by clearing and draining forest land, particularly in the Coastal Plain and Mississippi River Delta.

Research to obtain information on the amount, type, and trend of these changes to provide basic data for economic analysis has been carried out in several areas where these changes have taken place and are continuing at the present time.

The data presented in table 8 illustrate the type, amount, and trend in change of land use in typical areas where reversion of farmland and urban development are reducing agricultural acreage, and in other areas where new farmland is being added by clearing and draining woodland and forest.

TABLE 8.--Examples of shifts in land use, specified areas, United States[1]

Area	Time period	Amount and type of change (amount of change shown as equivalent percentage of 1959 harvested cropland acreage)[2]		
		New cropland and improved pasture developed	Cropland and improved pasture to urban use[3]	Cropland and improved pasture to forest[3]
		Percent	Percent	Percent
North Carolina:[4]				
Alamance Co.........	1938-60	24	6	15
Beaufort Co.........	1938-60	20	(5)	(5)
Orange Co...........	1938-60	13	3	16
Robeson Co..........	1938-60	14	(5)	(5)
Florida:[4]				
Alachua Co..........	1937-61	59	(5)	(5)
Polk Co.............	1941-58	47	(5)	(5)
Walton Co...........	1941-61	61	(5)	(5)
Louisiana, Ward 8, Madison Parish[6].....	1941-60	72	(5)	(5)
Arkansas, Carlton Township, Chicot Co.[6]	1944-58	38	(5)	(5)
Georgia, Terrell Co.[4]..	1941-56	1	(5)	5
South Carolina, Anderson Co.[4]........	1941-54	(5)	3	13
Massachusetts, Hampshire Co.[7].......	1952-58	(5)	11	14
Pennsylvania, Bucks Co.[4]...........	1938-58	(5)	20	(5)
New Jersey, Burlington Co.[4]...............	1940-56	(5)	33	(5)

[1] From airphoto analysis. For procedure see Dill (4).

[2] Detailed acreage by time periods studied is shown in appendix table 20.

[3] Includes idle cropland and idle pasture.

[4] Data from comparison analysis of airphoto index sheets.

[5] Less than 1 percent.

[6] Data from stereoscopic analysis of contact airphotos. Percentage shown is based on acreage of cropland identified on most recent airphoto coverage prior to 1961.

[7] Data from airphoto analysis of sample plots. For procedure see Dill and Nobe (5).

Land Use Trends in Alaska and Hawaii

From 1920 to 1960, total cropland acreage in Hawaii ranged from 400,000 to 500,000 acres annually, and grassland or nonforest pasture from 600,000 to 800,000 acres. Available information indicates that acreages of cropland and pasture from 1920 to 1960 were about 20 to 25 percent higher than the acreages from 1900 to 1920. Acreages by years, however, are not fully comparable, because of differences in definitions and methods of reporting.

The cropland acreage in Alaska in 1959 was 24,000 acres, about double the acreage in 1949. The acreage used for pasture also has increased.

A major obstacle in Alaska, as elsewhere, to increasing the number of operating farms and enlarging farms by improving cropland and pasture is the high cost of land development, However, land is being cleared. For the last 3 years over 1,000 acres per year were cleared. Crop production in Alaska is largely limited to cool-season species. Forage crops, hay, oats, potatoes, cabbage, and certain small fruits and vegetables thrive in the short summer season. Dairying to supply whole milk to local towns is a primary agricultural enterprise.

According to recent estimates, land in Alaska well suited for crop production under present economic conditions is, only about 1 million acres. Another 5 million acres supports fair to good summer grazing, although not all of it was used from 1954 to 1960 because of the difficulties of growing sufficient winter feed for livestock. Estimates indicate that 50 to 60 million acres is suitable as multiple use range for wildlife, reindeer, and domestic livestock.

About half of the land of Alaska is forest and wild grassland. Much of the land remaining is treeless tundra in the far north. Southern Alaska is dominated by high jagged mountains, many snow covered throughout the summer and traversed by great glaciers. North of the rugged coastal ranges, high plateaus and still higher mountains are interspersed with tundra plains and marshy valleys. Much of the most accessible valley lands and delta plains contain areas unsuited for crop production. Trends in major uses of land in Alaska and Hawaii are shown in table 9.

TABLE 9.--Cropland, pasture and range, Alaska and Hawaii, census years 1910 to 1959

Item	1910	1920	1930	1940	1950	1959
Alaska[1]	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Cropland..............................	3	6	9	11	12	24
Farm pasture and range..................	(2)	(2)	104	[3]316	[3] 366	[3] 350
Hawaii[4]						
Cropland..............................	305	435	441	413	465	500
Farm pasture and range[5]................	(2)	(2)	(2)	753	796	646
Woodland range[5]........................	(2)	(2)	(2)	387	412	441

[1] Census of Agriculture (16, 1959, vol.1, pt. 49); Agricultural Land Use in Alaska (2); and Land Management Annual Report (15, 1959).

[2] Data not available.

[3] Excludes considerable public land leased for grazing or otherwise used for domestic livestock. In addition to the pasture and range acreage reported, an estimated 50 to 60 million acres of potential range is suitable for wild game and domestic livestock. Information on land use in Alaska was obtained from Johnson and Jorgenson (8).

[4] Acreages for Hawaii for 1959 are based on unpublished data of the Department of Agriculture. Information on land use in Hawaii from Soil Conservation Service (21).

[5] Includes considerable State land.

Note: Annual data on crops harvested, 1947 to 1961, are published in Alaska and Hawaii State Reports, prepared cooperatively by the Alaska and Hawaii State Crop Reporting Services and the U.S. Statistical Reporting Service.

Major Classes of Land by Use and Ownership

Of the total land area in the United States in 1959, private land accounts for 1,332 million acres and Indian land 53.5 million acres. In the 50 States, 765 million acres of land are under Federal administration and 121 million acres under State and local government administration. Public highway and road rights-of-way are considered State and local government land.

Publicly administered Federal, State, and local government land, including Alaska and Hawaii, totals about 886 million acres, or nearly 40 percent of the total land area, according to estimates compiled in a study of the use of public land. Of the total publicly administered area, approximately 86 percent is for Federal purposes and 14 percent for State and local government purposes. Recent decreases in acreage represented transfers to other uses and sales of State-owned land. There have been offsetting changes, however, by acquisition for public reservoirs, airports, highway rights-of-way, public forests, rural parks, and wildlife refuges.

Major uses of the Federal and State land are grassland pasture and range, 23 percent; forest and woodland, 40 percent (including woodland grazed); special uses, 12 percent; and other land including desert, barren, tundra, and open swamp, 25 percent. Federal lands include Federal grazing areas, national parks, wildlife refuges, and national forest. General ownership and use classes of cropland, pasture, and range are given in table 10.

Of the total 407 million acres of Federal land in the 48 contiguous States, 362 million acres, or 89 percent, are in the 11 Western States. This is 48 percent of total acreage in these States. These lands are principally public-domain lands used for national forests, national parks, grazing, water supply, and for minerals.

Nearly 70 percent of the 53.5 million acres of Indian land is used by Indian farmers and livestock operators for farming and grassland pasture and range. In addition, about 12 million acres are in forest and used in timber production, as well as for grazing and wild game. The grazing privileges temporarily in excess of the need for Indian livestock are let out through competitive bidding.

Private and other non-Federal grassland pasture and range totals about 474 million acres for the 50 States. An additional 161 million acres of private and other non-Federal woodland and forest are used for grazing.

Federal range totals 243 million acres, of which about two-thirds is grassland or nonforest, and the rest woodland and forest. Thus, 878 million acres of the total land area, including both private and public land, are classed as pasture and range. Of the total acreage, 633 million acres are grassland or nonforest, and 245 million acres woodland and forest.

WATER AND AGRICULTURE

The Role of Water in Agriculture

The proper balance of land and water underlies all agriculture. Without sufficient water in the soil, crops will wilt and die. With too much water, lack of air will damage or kill crops. Water is used on farms for many other purposes--drinking, stock watering, sanitation, fire protection, spraying, and recreation.

The largest quantity of water used in agriculture is through replenishment of soil moisture by rain and snow. How much water is absorbed in the soil and how much runs off the land surface is modified by land treatment. Land treatment is defined by the U. S. Soil Conservation Service as "Use of land within its capabilities and the application of soil and water conservation measures and practices, singly or in combination." Included under this definition are contour-farming, terracing, reforestation, and other practices recommended in farm and ranch planning. In 1959, land treatment was practiced on the equivalent of approximately 300 million acres, or 18 percent of the total cropland, pasture and grazing land, and forest and woodland of the continental United States (excluding Alaska).[6]

Irrigation was used on 33 million acres in the United States in 1959, to take the place, or to supplement, precipitation. In the same year drainage to remove excess soil moisture was practiced on an estimated 155 million acres.

From 109 to 125 million acres, or about 6 to 7 percent, of the land area of the United States lies in the flood plain of rivers and streams. Surveys by the U. S. Department of the Army, Corps of Engineers (23), indicate

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[6] All subsequent figures for the United States are for the 48 contiguous States unless noted otherwise.

TABLE 10.--Major classes of land by use and ownership, United States, 1959

Ownership of land	Cropland		Grassland pasture and range		Forest		Special use and other land		Total	
	48 States	50 States	48 States	50 States	48 States	50 States	48 States	50 States	48 States	50 States
	Mil. acres	Mil. acres	Mil. acres	Mil. acres	Mil. acres	Mil. acres	Mil. acres	Mil. acres	Mil. acres	Mil. acres
Federal..........	0.8	0.8	157.1	159.1	[1] 198.5	[1] 323.9	[2] 50.6	[2] 281.2	407.0	765.0
State and other public[3].........	1.9	2.0	40.0	40.4	33.3	34.6	43.8	44.0	119.0	121.0
Indian[4]..........	2.5	2.5	35.0	35.1	12.0	12.0	3.9	3.9	53.4	53.5
Private[5]..........	451.8	452.3	398.0	398.4	394.7	402.3	77.9	78.8	1,322.4	1,331.8
Total[5].......	457.0	457.6	630.1	633.0	638.5	772.8	176.2	407.9	1,901.8	2,271.3

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[1] Includes all Federal forest, commercial and noncommercial, grazed and not grazed, and reserved forest in parks and other special uses.

[2] Excludes reserved forest in parks and other special uses which is included in Federal forest.

[3] Excludes State-grant land in process of transfer from the Federal public domain to the State of Alaska.

[4] Includes Indian trust and tribal lands in cropland, pasture and range, special uses, and other land. 4 million acres of Federal or government-owned land used by Indians in Alaska and about 600,000 acres in other States is included in the Federal acreage.

[5] Federal, State, local government, and Indian land acreages were obtained from public records and reports. Private land is the rest of the land area in each major use. The total land acreage assessed for taxation is reasonably close to the private acreage obtained by deducting the public and Indian land areas from the total.

that in 1959, 50 million acres received some flood protection. Some 49 million acres of rural land, almost half of which lies in the Mississippi Valley, received varying degrees of protection. Of this acreage, 54 percent is protected against the maximum flood of record; 20 percent is protected against floods of about 10 year frequency; and the rest, or 26 percent, is protected to a limited degree against floods.

Water for agriculture is taken from or carried off into many natural and man-made bodies of water. The competitive relation between land and water for space can be critical in some areas. According to a report by the U. S. Geological Survey (12), reservoirs and natural lakes with 5,000-acre-feet storage capacity or more for agricultural and other uses occupied over 11 million acres in 1954. These data are for surface areas at maximum controllable water level. From 1950 to 1960, the average increase in water area of large reservoirs was about 200,000 acres a year.

In 1959, agricultural uses of water were facilitated through almost a million smaller structures occupying some 840,000 acres when filled to capacity. These smaller structures included 913,000 stock ponds, 1,800 structures for watershed protection, and over 23,000 small reservoirs primarily on farms and in national forests that were used for irrigation, fire control, and recreation.

Water Use in Agriculture and Basic Relationship to Other Uses and Supply

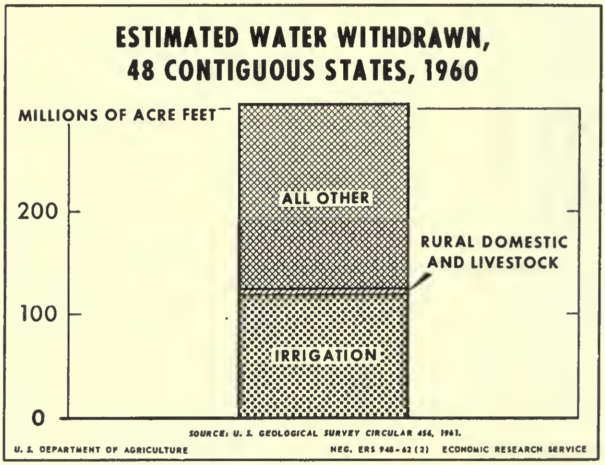
Rainfall in the United States averages 30 inches a year. Some 70 percent is evaporated and transpired by plants. Out of this comes the largest agricultural water use--nonirrigated crop, pasture, and forest production. The rest, or roughly 1,350 million acre-feet, is the long run available water supply for diversion from streams and replenishing water pumped from wells.

The proportion of rainfall that becomes available water supply in streams and ground water reservoirs is influenced by land treatment and drainage. The best estimates are that on an overall national basis, recently installed and prospective future land treatment measures do not diminish water supplies by more than 1 or 2 percent.

Data are not available for an appraisal of the effects of drainage on water supply. As in land treatment, recently installed prospective drainage may result in only small changes in overall national water supply. This is because of the recent emphasis in draining existing farmlands and improving drainage systems, rather than reclaiming extensive wetland areas through large drainage projects as in earlier years.

The latest estimates of the U. S. Geological Survey (10) place the quantity of water used for irrigation in 1960 near 120 million acre-feet, from a total of a little over 300 million acre-feet withdrawn from ground and surface sources for all purposes, including some 36 million acre-feet of saline water used by industry (fig. 5). If adjusted to the acreage irrigated in 1959, as reported by the Census of Agriculture, water used for irrigation would be approximately 105 million acre-feet in 1959. Use of water in rural homes, including farm homes, stock water, and other farm uses accounted for only some 4 million acre-feet.

Water can be reused if adequate quality is maintained so that a comparison between water supply and use should be made not in terms of gross use but in terms of the quantity of water actually used and not returned to streams defined as consumptive use. The U. S. Geological Survey (10) estimated consumptive use for 1960 at nearly 70 million acre-feet. Irrigation is much more significant on a consumptive-use basis, accounting for 80 to 90 percent of the total. These estimates exclude evaporation from water surfaces. Even if these were included, annual depletion of the overall water supply of 1,350 million acre-feet would probably be less than 10 percent.


ESTIMATED WATER WITHDRAWN, 48 CONTIGUOUS STATES, 1960

SOURCE: U. S. GEOLOGICAL SURVEY CIRCULAR 456, 1961.

U. S. DEPARTMENT OF AGRICULTURE NEG. ERS 948-62 (2) ECONOMIC RESEARCH SERVICE

Figure 5

Not all the water supply is available for consumptive use. Some water must be left in streams for navigation, recreation, and carrying the sewage outflows. Further, as variations in streamflow do not fully conform to the needs of man, increasing uses of water require additional capacity of storage reservoirs with rising storage costs and surface evaporation losses per acre-foot of additional available water.

Finally, both supplies and patterns of use vary in different parts of the country so that it is necessary to appraise water use in agriculture on a regional and local basis.

The Water Situation in the Western States

The area corresponding approximately to the 17 Western States has a long term annual water supply of roughly 375 million acre-feet, less than 30 percent of the total supply. Yet this same area supports over 90 percent of all irrigation and over 85 percent of all consumption. Further, nearly two-thirds of the water supply in this region is in the Pacific Northwest and northern California. Even in these areas much of the supply is in the form of seasonal peak flows requiring extensive storage works for fuller use.

Considerable ground water supplies are available for further irrigation development in parts of the Northern Great Plains, notably in Nebraska, Kansas, and Oklahoma. The greatest pressure on water resources is in the Southwestern States, a region extending from western Texas through southern California and northward through Colorado, Utah, and Nevada. Considerable depletion of ground water is taking place within this region, and irrigation is already declining in some parts of the region.

Pressures on water supplies in the southern California area are likely to be eased by long-distance conveyance from more water-plentiful regions. In a more limited way, developing remaining surface supplies, such as the proposed Central Arizona Project of the U. S. Bureau of Reclamation, may relieve some pressure on ground water in other parts of the Southwest. Some future augmentation of water supplies through weather modification and demineralization of brackish and ocean water is likely. However, these developments are unlikely to alter radically the water situation in the West in the foreseeable future.

In all parts of the West further irrigation development from surface sources will generally involve high costs. Pressure can be expected to increase for careful consideration of the most economic use of water resources and for public funds for water development. More emphasis will be placed on efficient water use in water-scarce areas, including public policies to encourage more efficient conveyance and application of irrigation water.

The Water Situation in the Humid Area States

The 31 Eastern States have roughly 1,000 million of the total water supply of 1,350 million acre-feet. In those States, gross water use for irrigation and withdrawals for other rural uses are relatively minor. However, they account for a considerable part of total consumptive use. Taking the East as a whole, water use for current irrigation and potential increases seem relatively minor when compared to the available supplies. Nevertheless, sharp conflicts over water between agriculture and other interests may arise on a local basis, particularly with recreational interests on small headwater streams and in draining areas that support wildlife. The quality standards for irrigation water, developed for Western conditions, will need to be modified in the East where impurities resulting from urban uses are more important.

IRRIGATION

Factors Influencing the Future of Irrigation

Irrigated acreage in the United States has grown from less than 8 million acres at the turn of the century to more than 33 million in 1959 (fig. 6). Despite the pinch on water supplies in some areas, irrigated acreage appears certain to expand both in the East and West in the coming decades. Perhaps the most basic determinants of the rate of expansion will be future population levels, per capita demand for agricultural products, and relative costs and returns of meeting the Nation's agricultural needs by irrigation compared to alternative means. The latter will be influenced by technology of water use in agriculture. Where major export crops, such as cotton, wheat, and rice are grown under irrigation, export levels will influence irrigation. In the subhumid Great Plains and to some degree in all humid States, interest in irrigation is likely to continue to fluctuate with the weather. Public policy in water law and water development will also be an important determinant, particularly in the West. For guidance of both the individual irrigator and public policy, a prime need is a better basic knowledge of crop response to soil moisture.

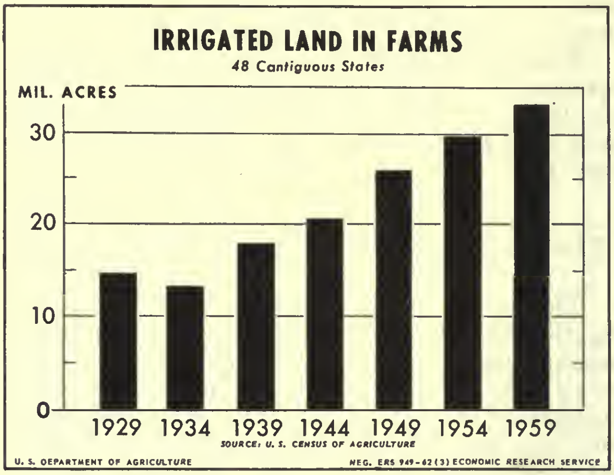
Use of Irrigated Land in the West

Use of irrigated land in the Western States in 1959 is shown graphically in figure 7. In terms of acreage, hay and pasture are most important. Land from which hay was cut, some 7.2 million acres, made up about 28 percent of 25.7 million acres of irrigated cropland harvested in the West. In addition, the major part of 5 million acres of irrigated land not harvested was used for pasture. Irrigated cropland used primarily for production of livestock feed (hay, sorghum, corn, oats, and other grains, excluding wheat, barley, and rice) accounted for about 51 percent of all irrigated cropland harvested. Small grains grown primarily for human consumption (wheat and rice) or partly for human consumption (barley) made up over 16 percent of the irrigated land harvested.

The remaining 33 percent contained the most valuable irrigated land in value per acre of crop production. Most significant in this group, because of their high value, was the acreage in tree fruits and vineyards, in vegetables, and in Irish potatoes. These three crop groups constituted 12 percent of the irrigated cropland. Cotton, important both in total acreage irrigated and in value per acre, made up over 13 percent of the irrigated acreage. Most of the 8 percent remaining was in sugar beets, dry field and seed beans, and alfalfa and clover seed crops.

Census coverage for irrigated crops in 1959 is more complete than coverage in other recent census years. For this reason conclusions regarding the trend in acres of individual irrigated crops cannot be made with certainty. It appears that substantial increases occurred in acreage of irrigated corn and grain sorghums. Acreages irrigated of cotton and possibly wheat also seem to have increased. Rice acreage fell sharply because of government controls. Acreages of other major irrigated crops do not appear to have changed much.

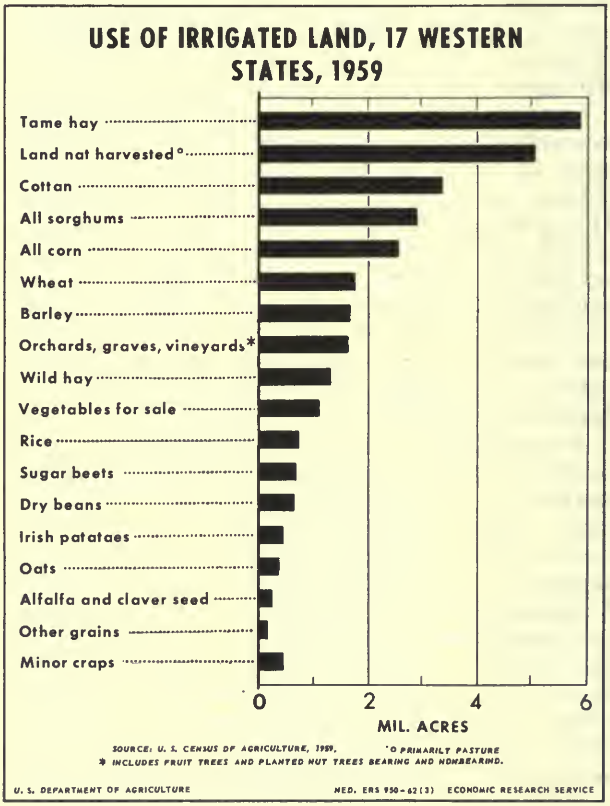
Most of the gains in corn, and to a significant degree, the gains in sorghum, cotton, and wheat, appear to be associated with the expansion of irrigation in the Great Plains Region, where most of the irrigated sorghum and 64 percent of the irrigated corn acreages were found. Over 50 percent of the irrigated cotton and about



SOURCE: U. S. CENSUS OF AGRICULTURE

U. S. DEPARTMENT OF AGRICULTURE NEG. ERS 949-62 (3) ECONOMIC RESEARCH SERVICE

Figure 6



SOURCE: U. S. CENSUS OF AGRICULTURE, 1959. °O PRIMARILY PASTURE
* INCLUDES FRUIT TREES AND PLANTED NUT TREES BEARING AND NONBEARING.

U. S. DEPARTMENT OF AGRICULTURE NEG. ERS 950-62 (3) ECONOMIC RESEARCH SERVICE

Figure 7

47 percent of the irrigated wheat acreages were in that region.

Significance of western irrigation.--Irrigated cropland harvested amounted to slightly more than 18 percent of cropland harvested in the 17 Western States in 1959. Nearly all cropland harvested was irrigated in Arizona and Nevada, over 75 percent in California, over 70 percent in Utah, over 60 percent in Wyoming, and over 50 percent in Idaho and New Mexico. The importance of western irrigation is much greater than would be suggested by these comparisons.

First, yields per irrigated acre are often several times those obtained for the same crop grown without irrigation. For example in 1954 yields of irrigated cotton in the West were about two and a half as much per acre as nonirrigated cotton throughout the United States. The U. S. Department of Agriculture estimated for 1954 (18) that irrigated pasture in the West yielded about 10 times as many pounds of forage per acre as nonirrigated pasture throughout the United States.

High-valued crops, combined with higher yields per acre, are concentrated on irrigated land. Irrigated cropland harvested made up less than 10 percent of the total cropland harvested in the United States in 1959. Yet, well over a third of the total U. S. acreage in orchards and vineyards and over 30 percent of the acreage of vegetables harvested for sale were found on irrigated land in the 17 Western States.

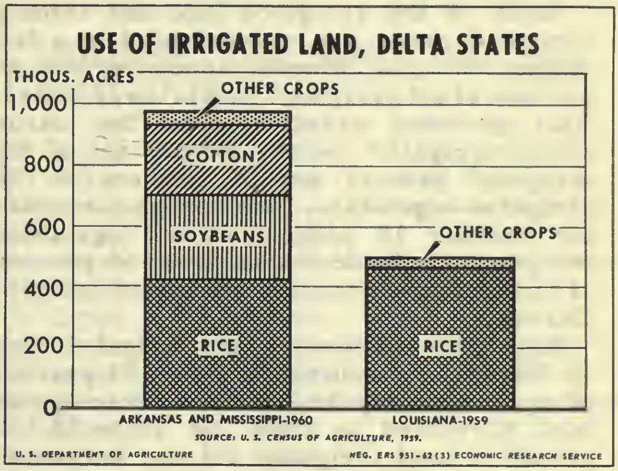
Finally, irrigated feed crops and pasture play a significant part in stabilizing the western livestock industry by providing a dependable feed base that permits more effective use of the extensive pasture areas, as well as the growth of large-scale livestock finishing operations near western population centers.

Use of Irrigated Land in the Humid Area States and Hawaii

Of the 2.3 million acres of irrigated land in the 31 humid-area States in 1959, approximately 1.3 million acres were in the Delta States. Use of irrigated land in these States--Mississippi, Arkansas, and Louisiana--differs sharply from that in the other humid-area States (16, 1959, vol. 1, vol. 5, pt. 2). Three crops dominate--rice, soybeans, and cotton--but are minor crops in the other States (fig. 8).

In contrast to the remaining humid-area States where irrigation expanded moderately, irrigation in the Delta States has been declining in recent years because of the decline in rice acreage. This decline was only partially offset by the sharp increases in acreages of soybeans and cotton irrigated.

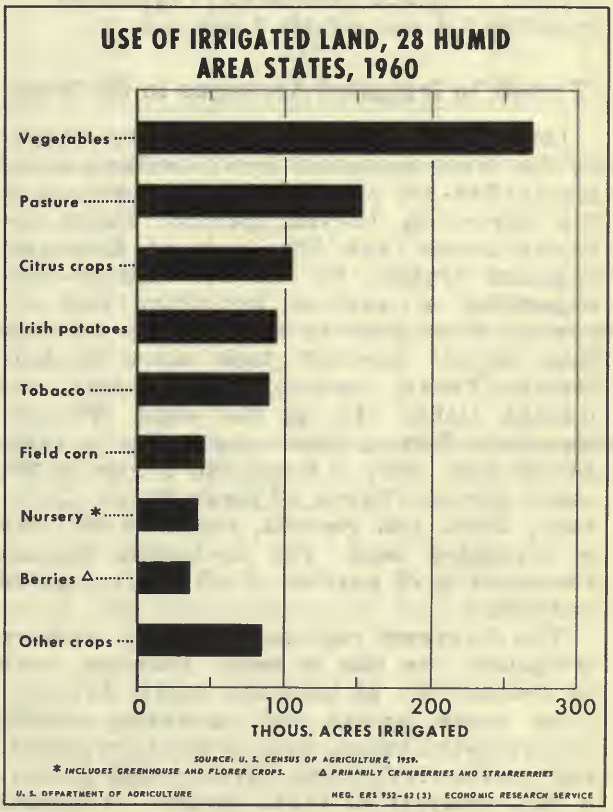
The leading crops for the remaining 28 humid area States are high-value specialty crops, such as vegetables, citrus, potatoes, tobacco, berries, and nursery crops (fig. 9).



SOURCE: U. S. CENSUS OF AGRICULTURE, 1959.

U. S. DEPARTMENT OF AGRICULTURE NEG. ERS 951-62 (3) ECONOMIC RESEARCH SERVICE

Figure 8



SOURCE: U. S. CENSUS OF AGRICULTURE, 1959.

* INCLUDES GREENHOUSE AND FLOWER CROPS. △ PRIMARILY CRANBERRIES AND STRAWBERRIES

U. S. DEPARTMENT OF AGRICULTURE NEG. ERS 952-62 (3) ECONOMIC RESEARCH SERVICE

Figure 9

Pasture, which generally falls sharply in grazing capacity in mid-summer, is an important irrigated crop. Irrigation of corn, hay, other feed crops, and cotton is not yet widespread.

From 1954 to 1960, there were sharp increases in acreages of tobacco irrigated. Irrigated pasture, however, dropped by about 30,000 acres.

Most of the irrigated land and leading irrigated crops are concentrated in a few States. In 1960, Florida accounted for 46 percent of all irrigated land in the 28 States. This included practically all the citrus crops irrigated, nearly 90 percent of the irrigated pasture and 50 percent of the irrigated vegetables. New Jersey accounted for another 15 percent of the vegetables irrigated in the 28 States. Over 50 percent of the irrigated tobacco was grown in North Carolina.

Sugarcane dominates on irrigated land in Hawaii, accounting for about 84 percent of approximately 72,700 acres of irrigated land harvested in 1959. Of some 68,500 acres of land irrigated but not harvested in 1959, 71 percent was in sugarcane. Pineapples accounted for 9 percent of irrigated cropland harvested. Vegetables made up 3.5 and alfalfa 2 percent.

Trends in Irrigated Acreages in the West

On a nationwide basis, irrigated acreages in the West expanded by 7.3 million acres from 1949-59, compared to 7.8 million in the preceding 10-year period. These national totals are the sum of divergent regional trends. Of the 6.5 million-acre expansion in western irrigation that occurred from 1949 to 1959, some 5.3 million, or 83 percent, took place in four States: Texas, Nebraska, California, and Kansas (table 11). In the eight Western Mountain States, total expansion in irrigation was only 0.5 million acres in the same period. Three of these States, Colorado, Utah, and Nevada, reported declines in irrigated land. The decline in Nevada amounted to 25 percent of all land irrigated in 1949.

The divergent regional trends in western irrigation are due to many reasons, such as availability of land and water, development costs, prices and marketing outlets for irrigated crops, agricultural programs, and public irrigation development policy. A full analysis of these factors is beyond the scope of this report but some highlights are noted.

Trends in irrigation differed for the four major western regions for the 20-year period, 1939-59 (table 12). The rapid rise of irrigation in the Southern Great Plains resulted largely from the availability of ground-water at reasonable cost. From 1949 to 1959, this upward trend was reinforced by a severe drought that gripped the region from the early part of the 1950's with no substantial relief until 1957. More favorable rainfall since 1957 is partly responsible for the slower rate of expansion of irrigation in the Southern Plains from 1954 to 1959. Near full development of some of the areas with moderate pumping lifts, lower prices for wheat and grain sorghum, and acreage restrictions are other important contributing factors.[7]

The increase in irrigation in the Northern Great Plains has both some parallels and differences when compared to the expansion in the Southern Plains. Both are subhumid to semiarid regions with considerable ground-water reserves. In both regions irrigation is relatively new and was stimulated by drought in the mid-1950's. In the Northern Great Plains, drought was less intensive but ground-water reserves in the main irrigation areas are not perennially overdrawn and ground-water levels are not falling as in much of the Southern Great Plains. Irrigation expansion in the Northern Great Plains has also been stimulated by large-scale public development programs of surface water resources.

Compared to the Great Plains, the Mountain States are less favored with ground-water and, in general, surface sources are more fully developed. Lack of rainfall appears largely responsible for the net decline of irrigated acreage in the Mountain States from 1949 to 1954. Future irrigation expansion will be limited by water supplies, particularly in New Mexico, Arizona, Utah, and Nevada.

In the Pacific States, availability of substantial ground and surface water as well as large public projects have favored growth of irrigation. The trend, however, is slowing with near full development of the less

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[7] The authors are indebted to William F. Hughes, Farm Economics Division, Economic Research Service, U. S. Department of Agriculture, College Station, Tex., for his suggestions concerning irrigation trends and prospects in the Southern Plains and in rice-producing areas.

See Hughes, W. F. Some Possible Directions of Change in Agricultural Water Use in Texas. Paper presented at the Seventh Annual Water for Texas Conference, College Station, Tex., Sept. 6-8, 1961. (Mimeographed.); also Hughes and Magee (7).

TABLE 11.--Irrigated land in farms, 17 Western States and United States, specified years 1949-1959

State and region	Irrigated land in farms[1]			
	1959	1954	1949	Increase or decrease(-) 1949-1959
	1,000 acres	1,000 acres	1,000 acres	1,000 acres
North Dakota..................	48	38	35	12
South Dakota..................	116	90	78	38
Nebraska......................	2,078	1,171	876	1,202
Kansas........................	762	332	139	623
Northern Plains.............	3,003	1,631	1,128	1,875
Oklahoma......................	198	108	34	164
Texas.........................	5,656	4,707	3,132	2,524
Southern Plains.............	5,853	4,815	3,166	2,688
Montana.......................	1,875	1,891	1,717	158
Idaho.........................	2,577	2,325	2,137	439
Wyoming.......................	1,470	1,263	1,432	38
Colorado......................	2,685	2,263	2,872	-188
New Mexico....................	732	650	655	77
Arizona.......................	1,152	1,177	964	189
Utah..........................	1,062	1,073	1,138	-76
Nevada........................	543	567	727	-184
Mountain....................	12,095	11,208	11,642	452
Washington....................	1,007	778	589	418
Oregon........................	1,384	1,490	1,307	77
California....................	7,396	7,048	6,438	957
Pacific.....................	9,787	9,317	8,334	1,453
Total 17 Western States....	30,738	26,971	24,271	6,467
Total Eastern States.......	2,284	2,581	1,517	767
Total Hawaii...............	141	([2])	117	24
Total United States[3].....	33,163	[4] 29,552	25,905	7,258

[1] Because of rounding, figures do not add to totals shown.

[2] Not available.

[3] Excludes Alaska. Irrigated acreage in Alaska in 1959 was estimated at only 358 acres by the Alaska Agricultural Experiment Station.

[4] Excludes Hawaii.

Source: Census of Agriculture (16, 1954, 1959).

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costly surface sources and fuller use of ground water. Further growth of irrigation in the Pacific States will be determined mostly by public policy concerning large-scale State and Federal water projects.

Trends in Irrigated Acreage in Humid Area States and Hawaii

While still small in comparison to the West, irrigation in the 31 humid States expanded from about 1.5 to 2.3 million acres from 1949 to 1959 (table 13). In Hawaii, both the relative and absolute rate of expansion was more moderate. From 1954 to 1959, humid-area irrigation declined by 0.3 million acres. This decline can be explained by a drop in rice acreage in the Delta States of more than a half million acres because of acreage controls. Technological improvements in prospect for rice production and limited domestic demand could lead to further declines--unless offset by expanding exports. A small decline also occurred in the Southeastern States between 1954 and 1959 caused by a 14,000-acre decrease in irrigated land in Florida.

In other parts of the Eastern States, irrigation generally continued to expand from 1954 to 1959 although, at a much slower rate than in the preceding 5 years. This slower rate of expansion seems to have resulted largely from more rainfall in recent years contrasted to the scanty rainfall in the early 1950's.

TABLE 12.--Increase in irrigation, 4 Western Regions 1939-59[1]

Region	1939-1944	1944-1949	1949-1954	1954-1959
	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Southern Plains	423	1,843	1,650	1,038
Northern Plains	173	325	503	1,372
Mountain	790	939	-434	887
Pacific	801	1,732	982	470
Total Western Regions	2,188	4,839	2,700	3,767

[1] Because of rounding, figures do not add to totals shown.

Source: Census of Agriculture (15, 1950, 1954, 1959).

TABLE 13.--Irrigated land in farms by regions, 31 humid-area States, specified years 1949-1959[1]

Region	Irrigated land in farms			Increase, 1949 over 1959
	1949	1954	1959	
	Acres	Acres	Acres	Acres
Northeast	87,167	188,178	205,751	118,584
Lake States	27,917	50,879	87,031	59,114
Corn Belt	16,030	69,300	87,474	71,444
Appalachian	6,437	84,591	117,543	111,106
Southeast	375,357	490,347	489,535	114,178
Delta States	1,003,968	1,698,171	1,296,348	292,380
Total humid-area States	1,516,876	2,581,466	2,283,682	766,806

[1] For State data, see appendix, table 23.

Source: U.S. Census of Agriculture (16, 1954, 1959).

Sources of Irrigation Water in the West

Land irrigated with water from farms and irrigation organizations.--Water supply for western irrigation either comes from farms or projects operated by supply organizations, such as irrigation districts and mutual and commercial companies. Acreages irrigated by farms and organizations are given in table 14. In the last decade farm sources have increased in importance over organization sources. In 1959, farm sources supplied water for over 58 percent of irrigated land in the West compared to a maximum of 49 percent in 1950. Much of this trend is due to the rapid expansion of well irrigation in the Great Plains, notably in Texas, Nebraska and Kansas.

Of 30.7 million acres irrigated in the 17 Western States in 1959, somewhat less than 7 million acres were served entirely or in part with water supplies developed by the U. S. Bureau of Reclamation. Some 578,000 additional acres were served by the U. S. Bureau of Indian Affairs.

Land irrigated by ground and surface sources.--The proportion of land irrigated by ground water has increased steadily since 1900 and is estimated at 45 percent of all land irrigated in the West. The percentage of water supplies coming from ground-water sources is considerably smaller as much of the ground-water irrigation is in subhumid regions where water applications per acre are less than in arid regions. Further, water lost in conveyance is generally much less with ground-water irrigation than with irrigation from surface sources.

About 95 percent of the land served by ground water comes from farm sources. Water furnished by supply organizations is mostly surface water, except in Arizona with nearly 40 percent, Oregon 6 percent, and California 10 percent of organization water, being ground water.

In 1959, seven Western States irrigated more than half of their land with ground water. In three of these--Nebraska, Kansas, and Oklahoma--ground-water supplies permit considerable additional irrigation development. In the remaining four--California, Texas, New Mexico, and Arizona--supplies permit little new net development of ground-water as a long-term dependable irrigation source. Serious problems of lowered ground-water levels and contamination by saline water have already been encountered in these four States. In some regions of these four States, notably in parts of the High Plains of Texas, considerable expansion of ground-water irrigation from deep wells could take place if price-cost relationships are favorable. However, this expansion may well be more than offset by declines in the more fully developed parts of the Plains.

Sources of Water in the Humid Area States and Hawaii

Outside the 17 Western States, Louisiana, and Hawaii, little water for irrigation is sold. The Census 1960 Survey of Irrigation in Humid Areas (16, 1959, vol. 5) in the 30 remaining contiguous States reported less than 2 percent of some 1.87 million acres served by irrigation or drainage organizations or municipal water systems. Some 66 percent of the irrigated area was served by ground-water sources and 32 percent by surface sources, generally developed on individual farms.

The proportion of acreage irrigated by ground water sources varied considerably, from 81 percent in the Delta States (excluding Louisiana) to 26 percent in the Appalachian States. Nearly two-thirds of the irrigated land in the Corn Belt and from one-half to three-fifths of the irrigated acreages in Northeast, Southeast, and Lake States were served with ground water.

In Louisiana, irrigation organizations are an important source of water. They accounted for over 22 percent of the nearly 485,000 acres irrigated in 1959. Farm-ground sources served 51 percent, and surface sources 27 percent of the irrigated lands. An estimated 84 percent of land irrigated by organizations was served from surface sources and the rest from ground water.

In Hawaii 62 percent of some 142,000 acres irrigated in 1959 were supplied by irrigation organizations. Farm-surface sources provided for slightly over half of the remaining land irrigated with farm-ground water used on 18 percent of the total irrigated area.

DRAINAGE

The sparse account of drainage given here in comparison to irrigation, reflects the degree of data reported for the two practices, not their relative significance. The acreage of farmland drained for the

TABLE 14.--Land irrigated by source of water, by regions, 17 Western States, 1959[1] [2] [3]

Region	Farm source			Irrigation organizations	Farm and organization sources	Part of all land served by ground-water[4]
	Ground-water	Surface-water	All			
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	Percent
Northern Plains.............	2,141	168	2,309	694	3,003	71
Southern Plains.............	4,762	224	4,986	867	5,853	82
Mountains..................	2,181	3,017	5,199	6,896	12,095	21
Pacific.....................	3,914	1,541	5,455	4,331	9,787	44
Total or averages, 17 Western States....................	12,998	4,951	17,949	12,789	30,738	45

[1] Figures do not add to totals shown because of rounding.

[2] For State data, see appendix, table 24.

[3] In the 1959 Census of Agriculture, farmers reported the percentage of irrigation water obtained from (1) farm ground, (2) farm-surface water, and (3) irrigation organization sources. The Census multiplied the percentages for each farm by averages, irrigated and summed the resulting equivalent acreage irrigated from each source.

[4] Acreages served by organizations were not separated by ground and surface water in preliminary Census reports. In estimating the total acreage served by ground-water sources, it was assumed that the percentage of land served by organizations by ground-water sources was equal to the percentage of all water conveyed by organizations from natural sources within each State, that originated from ground-water sources.

Source: U.S. Census of Agriculture, (16, 1959, Vol. I), and 1959 Census of Irrigation, preliminary State summaries of water conveyed by irrigation organizations.

United States is not known with certainty, but estimated at 155 million in 1959. This is almost 5 times the acreage irrigated, and includes some of the Nation's most valuable farmlands. Few people realize the vast transformation of mosquito infested swamps resulting from drainage. As written in Genesis, so in large stretches of the Midwest and South it was necessary to: "Let the waters under the heaven be gathered unto one place, and let the dry land appear."

Factors Affecting the Future of Drainage

The same factors influencing the future of irrigation will also influence the future of drainage, such as the demand for agricultural products, and the relative costs of meeting the Nation's needs by drainage as compared to alternative means. Costs of drainage compare favorably with Western irrigation from surface sources of water and are competitive with well irrigation and most humid area irrigation. As described below, there is a considerable supply of land on which agricultural production could be made feasible or be increased by drainage.

Public policy, particularly with respect to watershed protection and conservation incentive payments, will influence the extent of future drainage. Flood protection and irrigation development will also influence the future of drainage as much flood plain land requires drainage, and removing excess water is often an essential complement to irrigation.

Use of Drained Agricultural Land

Although a census was never made of crops grown on lands improved by drainage, some generalizations are possible. At least 80 percent of the drained agricultural lands is used for harvested crops. From location maps of land in drainage projects, the following appraisal is made of principal crops grown under drainage.

In the Corn Belt probably the most widespread use of drained land is growing feed grains, principally corn and soybeans. These crops are also grown in areas with considerable drained land that lie outside the Corn Belt. North of the Corn Belt, in the extensive drained areas of southern Michigan and Minnesota, forage crops are more frequently grown.

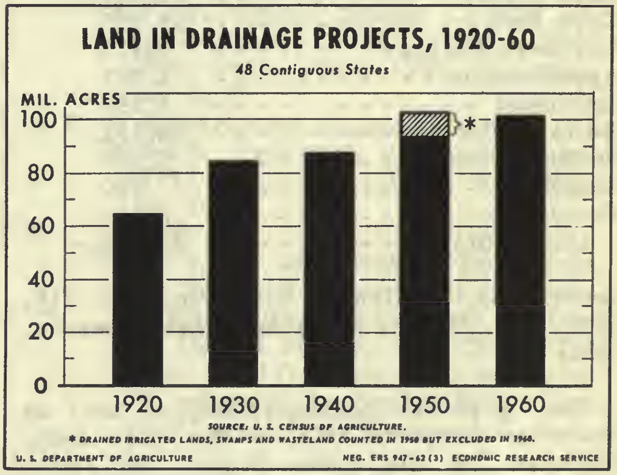
Truck and fruit crops are important on drained lands. These are found on the Atlantic Coast from New York through Delaware, in parts of North Carolina, in much of southern Florida, along much of the Gulf Coast of Louisiana and Texas, and in the Rio Grande Valley. Truck and fruit crops are also grown on drained land in central and southern California.

Cotton is grown extensively on drained land mainly in the Mississippi Valley and in California where drainage and irrigation are combined. This is similar to rice, a crop grown entirely under irrigation primarily in Arkansas, Louisiana, Texas, and California, where drainage is used in conjunction with irrigation.

Trends in Drainage

Land in drainage projects grew from less than 7 million acres at the turn of the century to 102 million acres in 1960 (fig. 10). Growth was most rapid in the first quarter of the century, with another spurt of growth in the 1940-50 decade. In 1960, 92.3 million acres in drainage projects were drained and used for agricultural production.

Lands included in the census reports are limited to drainage projects of 500 or more acres and consist primarily of group undertakings.[8] Outside drainage projects, perhaps another 55 to 60 million acres had been drained by individual farmers, with an additional 5 million acres of drained land on irrigation projects not counted as drainage projects.


LAND IN DRAINAGE PROJECTS, 1920-60

48 Contiguous States

SOURCE: U. S. CENSUS OF AGRICULTURE.

* DRAINED IRRIGATED LANDS, SWAMPS AND WASTELAND COUNTED IN 1950 BUT EXCLUDED IN 1960.

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Figure 10

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[8] See Census of Agriculture (16, 1959, vol. 4, p. XVI). The equivalent designation used in the 1950 Census Report was "Drainage Enterprise."

The drained agricultural area within projects increased by approximately 5.3 million acres from 1950 to 1959, but considerably more drainage was accomplished during the same period. From 1950 to 1959 farmers, with the assistance of the Agricultural Conservation Program of the U. S. Department of Agriculture, did drainage work on a total 16.9 million acres. This total, consisting of open and enclosed drainage and shaping of land for drainage, was more than twice the growth of irrigated land during the same period. Assistance on drainage was given on 21,000 additional acres in Alaska, Hawaii, Puerto Rico, and off-shore possessions.

Assistance under the Agricultural Conservation Program is confined to existing cropland and pasture, and is not permitted for bringing new land into production. Therefore no new large scale drainage has resulted from this program. Much of the program has been for on-farm drainage and improving existing drainage work, with little area expansion under drainage projects.

Location of Existing and Potential Drained Land

Land in drainage projects drained and used for agriculture in 1960 was distributed as follows:

Region	1,000 acres
Northeast	752
Lake States	21,022
Corn Belt	35,395
Northern Plains	3,412
Appalachian	2,893
Southeast	5,353
Delta States	14,832
Southern Plains	5,825
Mountain	390
Pacific	2,423
United States	92,297

Source: U. S. Census of Agriculture (16, 1959, vol. 4). For State data, see appendix, table 25.

The greatest concentration of land in drainage projects lies in the Corn Belt, followed by the Lake States and Delta States. These three regions accounted for 77 percent, Texas 6 percent, and Florida 5 percent of all land in drainage projects.

The Corn Belt and Lake States of Indiana, Minnesota, Michigan, Ohio, and Iowa contained about half the 1960 total of drained land within drainage projects.

Although it does not include all drainage development, location of lands drained under the Agricultural Conservation Program indicates the location of drainage activities in recent years. The regional distribution of all types of drainage under the Agricultural Conservation Program from 1950 to 1959 inclusive was as follows:

Region	1,000 acres (10-year total)
Northeast	529
Lake States	3,004
Corn Belt	3,680
Northern Plains	1,430
Appalachian	1,045
Southeast	1,377
Delta States	3,514
Southern Plains	366
Mountain	547
Pacific	1,457
United States	16,949

Source: U. S. Department of Agriculture, Agricultural Stabilization and Conservation Service. For 1950-1958, unpublished summaries. For 1959, see Statistical Summary, 1959 (14). Includes enclosed and open drainage, and shaping and grading of land for surface drainage. For State data, see appendix, table 25.

For land in organized drainage projects, the Corn Belt leads in recent drainage installed under the Agricultural Conservation Program. The Delta States are a close second and the Lake States third. Of all land drained under the program from 1950 to 1959, 60 percent fell in the Corn Belt, Delta, and Lake States; another 16 percent in the four States of California, South Carolina, North Carolina, and North Dakota.

Preliminary estimates from the nationwide sample survey of conservation needs of the U. S. Department of Agriculture indicate that there are some 60 million acres of cropland on which excess water is a dominant problem. Once again, the three leading regions that contain 70 percent of the estimated total cropland area in need of drainage are the Corn Belt, Lake States, and Delta States.

Outside these three regions, six States have an estimated 1 to 2 million acres of cropland requiring drainage. These States that contain 14 percent of the total cropland needing drainage, are Texas, North Carolina, California, Tennessee, North Dakota, and New York.

In addition to land presently used for agriculture, there is a considerable fertile but undeveloped land area in the United States that could be farmed if adequately drained. Much of this undeveloped land area would require clearing. An article by Wooten and Jones on the history of drainage enterprises (27) estimated that some 20 million acres could be developed through drainage. Of this total, about 7 million acres are in the Delta States and another 7 to 8 million in the Coastal Plain of the Southeast.

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APPENDIX

Tables

TABLE 15.--Summary of agricultural uses of land, 50 States, 1959

State and region	Cropland[1]	Grassland pasture and range[2]	Forest and woodland[3]	Other land[4]	Approximate land area[5]
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Maine	1,186	291	17,425	946	19,848
New Hampshire	360	86	4,848	475	5,769
Vermont	988	692	3,730	527	5,937
Massachusetts	467	192	3,288	1,088	5,035
Rhode Island	53	21	434	169	677
Connecticut	358	194	1,990	593	3,135
New York	6,978	3,543	14,450	5,710	30,681
New Jersey	1,006	203	2,229	1,375	4,813
Pennsylvania	6,916	2,169	15,186	4,534	28,805
Delaware	574	30	392	270	1,266
Maryland	2,087	578	2,920	734	6,319
District of Columbia	--	--	--	39	39
Northeast	20,973	7,999	66,892	16,460	112,324
Michigan	10,470	1,763	19,682	4,577	36,492
Wisconsin	12,502	3,182	15,588	3,739	35,011
Minnesota	22,523	3,321	19,344	6,018	51,206
Lake States	45,495	8,266	54,614	14,334	122,709
Ohio	12,427	3,364	5,446	4,985	26,222
Indiana	14,198	1,868	4,103	2,989	23,158
Illinois	23,864	3,321	3,993	4,617	35,795
Iowa	26,551	5,153	2,620	1,537	35,861
Missouri	18,050	8,100	15,187	2,911	44,248
Corn Belt	95,090	21,806	31,349	17,039	165,284
North Dakota	28,275	13,457	467	2,253	44,452
South Dakota	19,070	26,113	2,169	1,530	48,882
Nebraska	23,637	22,266	1,073	2,056	49,032
Kansas	30,072	17,907	1,668	2,864	52,511
Northern Plains	101,054	79,743	5,377	8,703	194,877
Virginia	4,427	3,592	16,114	1,363	25,496
West Virginia	1,521	2,575	9,907	1,408	15,411
North Carolina	7,358	1,556	20,076	2,413	31,403
Kentucky	8,536	2,871	11,497	2,608	25,512
Tennessee	8,148	2,390	12,608	3,582	26,728
Appalachian	29,990	12,984	70,202	11,374	124,550

See footnotes at end of table.

TABLE 15.--Summary of agricultural uses of land, 50 States, 1959--Continued

State and region	Cropland[1]	Grassland pasture and range[2]	Forest and woodland[3]	Other land[4]	Approximate land area[5]
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
South Carolina	4,541	941	12,016	1,876	19,374
Georgia	7,458	2,498	24,057	3,282	37,295
Florida	3,044	7,425	21,016	3,236	34,721
Alabama	6,028	3,075	20,771	2,804	32,678
Southeast	21,071	13,939	77,860	11,198	124,068
Mississippi	7,183	3,135	17,225	2,680	30,223
Arkansas	8,570	3,463	20,816	750	33,599
Louisiana	5,055	2,760	16,129	4,924	28,868
Delta States	20,808	9,358	54,170	8,354	92,690
Oklahoma	15,096	15,022	10,051	3,919	44,088
Texas	38,820	94,217	28,099	7,082	168,218
Southern Plains	53,916	109,239	38,150	11,001	212,306
Montana	15,243	50,641	22,330	5,057	93,271
Idaho	5,821	22,289	21,815	3,008	52,933
Wyoming	2,768	46,390	10,513	2,672	62,343
Colorado	11,846	29,436	20,834	4,370	66,486
New Mexico	2,650	48,446	21,329	5,341	77,766
Arizona	1,557	42,455	19,212	9,464	72,688
Utah	2,219	24,665	16,219	9,594	52,697
Nevada	848	48,510	12,036	8,870	70,264
Mountain	42,952	312,832	144,288	48,376	548,448
Washington	8,053	8,127	23,868	2,646	42,694
Oregon	5,474	23,217	30,261	2,647	61,599
California	12,607	22,621	42,451	22,528	100,207
Pacific	26,134	53,965	96,580	27,821	204,500
Total, 48 contiguous States	457,483	630,131	639,482	174,660	1,901,756
Alaska	24	2,350	132,314	230,793	365,481
Hawaii	500	646	2,000	960	4,106
United States, (50 States).	458,007	633,127	773,796	406,413	2,271,343

[1] Used chiefly for crops in 1959. Includes cropland harvested (with addition of crops, gardens, and orchards not otherwise reported, and wild hay harvested); crop failure, summer fallow, cropland in soil-improvement and cover crops not harvested or pastured, or used for another crop; temporarily idle cropland; and cropland used only for pasture.

[2] All grassland and other nonforested pasture (not cropland and not woodland), including pasture and range in farms and public land not in farms.

[3] Woodland and forest, both private and public, including 27 million acres withdrawn from primary forest use for parks and other special public-use areas. Because of multiple uses, there is duplication of 27 million acres between forest land and special-use areas. The total woodland and forest area for the 50 States, as of July 1960, was approximately 773 million acres, according to the forest inventory of the U.S. Forest Service.

[4] Urban and town areas, farmsteads and farm roads and lanes, highway and railroad rights-of-way, airports, and the nonforested parts of national and State parks, wildlife refuges, national defense areas, flood-control areas, and other special-use areas.

Includes also miscellaneous areas such as marshes, open swamps, bare rock, deserts, sand dunes, and other land which now generally has low value for agricultural purposes but which has utility for wildlife and recreational use and potential value for minerals.

[5] As reported by the Census of Agriculture (16, 1959).

TABLE 16.--All cropland, including cropland used for crops and cropland used only for pasture, by regions and States, 50 States, 1959

State and region	Cropland used for crops[1]	Cropland used for soil improvement crops and idle[2]	Cropland used only for pasture[3]	Total cropland[4]
	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Maine	717	298	171	1,186
New Hampshire	211	77	72	360
Vermont	761	31	196	988
Massachusetts	298	66	103	467
Rhode Island	35	3	15	53
Connecticut	246	33	79	358
New York	5,198	499	1,281	6,978
New Jersey	688	193	125	1,006
Pennsylvania	5,091	980	845	6,916
Delaware	440	91	43	574
Maryland	1,504	296	287	2,087
Northeast	15,189	2,567	3,217	20,973
Michigan	7,388	1,684	1,398	10,470
Wisconsin	9,876	639	1,987	12,502
Minnesota	19,404	1,847	1,272	22,523
Lake States	36,668	4,170	4,657	45,495
Ohio	10,045	877	1,505	12,427
Indiana	11,424	1,087	1,687	14,198
Illinois	21,380	408	2,076	23,864
Iowa	23,424	277	2,850	26,551
Missouri	12,541	805	4,704	18,050
Corn Belt	78,814	3,454	12,822	95,090
North Dakota	25,480	2,039	756	28,275
South Dakota	16,022	1,864	1,184	19,070
Nebraska	21,450	878	1,309	23,637
Kansas	27,248	1,379	1,446	30,072
Northern Plains	90,199	6,160	4,695	101,054
Virginia	2,978	431	1,018	4,427
West Virginia	863	138	520	1,521
North Carolina	5,101	1,583	674	7,358
Kentucky	4,209	258	4,069	8,536
Tennessee	4,280	651	3,217	8,148
Appalachian	17,431	3,061	9,498	29,990

See footnotes at end of table.

TABLE 16.--All cropland, including cropland used for crops and cropland used only for pasture, by regions and States, 50 States, 1959 - Continued

State and region	Cropland used for crops[1]	Cropland used for soil improvement crops and idle[2]	Cropland used only for pasture[3]	Total cropland[4]
	1,000 acres	1,000 acres	1,000 acres	1,000 acres
South Carolina	2,965	935	641	4,541
Georgia	5,451	703	1,304	7,458
Florida	2,044	61	939	3,044
Alabama	4,106	509	1,413	6,028
Southeast	14,566	2,208	4,297	21,071
Mississippi	4,858	695	1,630	7,183
Arkansas	5,627	673	2,270	8,570
Louisiana	2,585	438	2,032	5,055
Delta States	13,070	1,806	5,932	20,808
Oklahoma	11,080	1,422	2,586	15,096
Texas	26,563	4,057	8,200	38,820
Southern Plains	37,651	5,479	10,786	53,916
Montana	14,052	246	945	15,243
Idaho	5,004	151	666	5,821
Wyoming	2,075	105	588	2,768
Colorado	9,014	1,597	1,235	11,846
New Mexico	1,275	946	429	2,650
Arizona	1,258	95	204	1,557
Utah	1,363	447	409	2,219
Nevada	363	123	362	848
Mountain	34,404	3,710	4,838	42,952
Washington	6,914	415	724	8,053
Oregon	4,184	348	942	5,474
California	9,366	208	3,033	12,607
Pacific	20,464	971	4,699	26,134
Total, 48 contiguous States	358,456	33,586	65,441	457,483
Alaska	16	4	4	24
Hawaii	320	13	167	500
United States (50 States)	358,792	33,603	65,612	458,007

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[1] Includes cropland harvested, crop failure, and cultivated summer fallow. An upward adjustment of about 2 percent in the acreage of cropland harvested reported by the Census of Agriculture (16,1959) was made to conform to the estimates of acreages of crops harvested as reported in Crop Production (22,1961) and other crop reports issued in 1960 and 1961 by the Statistical Reporting Service. Cropland used for crops includes cropland harvested 317,328,000 acres; crop failure 10,606,000 acres; and cultivated summer fallow 30,858,000 acres.

[2] Includes cropland idle and cropland used for cover of soil-improvement crops not harvested and not pastured. Total cropland used for soil-improvement crops 23,590,000 acres and cropland idle 10,013,000 acres.

[3] Cropland used only for pasture is cropland in the rotation which is used some years for cultivated crops and other years for pasture.

[4] Total cropland, including cropland used only for pasture, represents the cropland available for crops, or in the rotation.

TABLE 17.--Pasture and range by type, region, and State, 50 States, 1959

State and region	Private, State, and Indian		Federal range[3]	Total pasture and range[4]
	Open permanent pasture and range[1]	Woodland pasture and range[2]		
	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Maine	291	200	1	492
New Hampshire	86	127	--	213
Vermont	692	600	2	1,294
Massachusetts	192	90	--	282
Rhode Island	21	10	--	31
Connecticut	194	95	--	289
New York	3,537	1,840	10	5,387
New Jersey	202	20	1	223
Pennsylvania	2,168	291	4	2,463
Delaware	30	12	1	43
Maryland	578	179	5	762
Northeast	7,991	3,464	24	11,479
Michigan	1,756	1,240	12	3,008
Wisconsin	3,180	2,900	5	6,085
Minnesota	3,319	1,871	3	5,193
Lake States	8,255	6,011	20	14,286
Ohio	3,360	1,537	6	4,903
Indiana	1,857	1,477	11	3,345
Illinois	3,308	1,895	13	5,216
Iowa	5,147	1,549	6	6,702
Missouri	8,100	6,171	256	14,527
Corn Belt	21,772	12,629	292	34,693
North Dakota	12,297	329	1,160	13,786
South Dakota	24,740	411	1,825	26,976
Nebraska	21,899	764	383	23,046
Kansas	17,808	1,040	116	18,964
Northern Plains	76,744	2,544	3,484	82,772
Virginia	3,571	1,353	25	4,949
West Virginia	2,573	1,828	13	4,414
North Carolina	1,556	1,351	5	2,912
Kentucky	2,863	2,066	8	4,937
Tennessee	2,376	1,810	58	4,244
Appalachian	12,939	8,408	109	21,456
South Carolina	941	2,225	403	3,569
Georgia	2,489	4,217	10	6,716
Florida	7,425	7,540	583	15,548
Alabama	3,074	4,691	80	7,845
Southeast	13,929	18,673	1,076	33,678

See footnotes at end of table.

TABLE 17.--Pasture and range by type, region, and State, 50 States, 1959--Continued

State and region	Private, State, and Indian		Federal range[3]	Total pasture and range[4]
	Open permanent pasture and range[1]	Woodland pasture and range[2]		
	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Mississippi	3,135	6,282	417	9,834
Arkansas	3,390	12,881	942	17,213
Louisiana	2,717	7,560	593	10,870
Delta States	9,242	26,723	1,952	37,917
Oklahoma	14,924	7,562	259	22,745
Texas	93,931	22,151	930	117,012
Southern Plains	108,855	29,713	1,189	139,757
Montana	42,873	4,128	15,540	62,541
Idaho	7,765	3,518	19,076	30,359
Wyoming	28,526	578	21,130	50,234
Colorado	21,405	6,783	14,619	42,807
New Mexico	37,637	7,710	20,104	65,451
Arizona	27,011	7,889	23,223	58,123
Utah	9,174	2,994	27,352	39,520
Nevada	7,742	700	51,492	59,934
Mountain	182,133	34,300	192,536	408,969
Washington	7,299	3,432	2,496	13,227
Oregon	10,286	5,425	20,212	35,923
California	13,545	8,973	17,010	39,528
Pacific	31,130	17,830	39,718	88,678
Total, 48 contiguous States	472,990	160,295	240,400	873,685
Alaska	350	520	2,120	2,990
Hawaii	646	441	0	1,087
United States (50 States)	473,986	161,256	242,520	877,762

[1] Includes private, State, local government, and Indian land used for pasture and grazing, mostly in farms and other non-Federal grassland range (not cropland and not woodland) not in farms.

[2] Includes forest and woodland pastured in farms and woodland and other non-Federal forest grazed or classified as usable for grazing not in farms.

[3] Includes some 159 million acres in grassland pasture and range, and over 83 million acres of woodland and forest grazed during part of the year in the 50 States.

[4] Includes both grassland pasture and grazing land and woodland and forested land used for grazing.

TABLE 18.--Federal pasture and range, forest and woodland, and total range, 1959

State and region	Grassland and range[1]	Forest and woodland[2]	Total Federal range[3]
	1,000 acres	1,000 acres	1,000 acres
North Dakota	1,160	--	1,160
South Dakota	1,373	452	1,825
Nebraska	367	16	383
Kansas	99	17	116
Northern Plains	2,999	485	3,484
Oklahoma	98	161	259
Texas	286	644	930
Southern Plains	384	805	1,189
Montana	7,768	7,772	15,540
Idaho	14,524	4,552	19,076
Wyoming	17,864	3,266	21,130
Colorado	8,031	6,588	14,619
New Mexico	10,809	9,295	20,104
Arizona	15,444	7,779	23,223
Utah	15,491	11,861	27,352
Nevada	40,768	10,724	51,492
Mountain	130,699	61,837	192,536
Washington	828	1,668	2,496
Oregon	12,931	7,281	20,212
California	9,076	7,934	17,010
Pacific	22,835	16,883	39,718
17 Western States	156,917	80,010	236,927
31 Eastern States	224	3,249	3,473
Total, 48 contiguous States	157,141	83,259	240,400
Alaska	2,000	120	2,120
Hawaii	--	--	--
United States (50 States)	159,141	83,379	242,520

[1] An approximation of grassland, shrub, and brush land (not classified as forest) used or usable for grazing.

[2] Approximate forest and woodland range.

[3] Total Federal range in all States assembled from records and reports of the principal Federal agencies administering Federal land. (No Federal range reported in Hawaii.)

TABLE 19.--State land under lease for grazing and farming, 17 Western States[1]

State and region	Grazing	Farming	Total
	1,000 acres	1,000 acres	1,000 acres
North Dakota	923	--	923
South Dakota	1,968	3	1,971
Nebraska	1,286	338	1,624
Kansas[2]	--	--	--
Northern Plains	4,177	341	4,518
Oklahoma	249	310	559
Texas	2,760	--	2,760
Southern Plains	3,009	310	3,319
Montana	4,108	480	4,588
Idaho	2,232	76	2,308
Wyoming	3,572	20	3,592
Colorado	2,775	143	2,918
New Mexico	11,265	76	11,341
Arizona	8,584	222	8,806
Utah	1,800	40	1,840
Nevada	36	--	36
Mountain	34,372	1,057	35,429
Washington	854	232	1,086
Oregon	502	--	502
California	47	--	47
Pacific	1,403	232	1,635
Total, 17 Western States	42,961	1,940	44,901

[1] Chiefly school-grant lands. Assembled from records and reports of the Land Management offices for years 1958 to 1960.

[2] No State land reported under lease for grazing and farming.

TABLE 20.--Land in special-use areas, by regions and States, 50 States, 1959[1]

State and region	Urban areas[2]	Rural highways, railroads, and airports[3]	Rural parks[4]	Wildlife areas[5]	National defense, flood control, and industrial areas[6]	State-owned institutions and miscellaneous other uses[7]	Farmsteads, farm roads and lanes[8]	Total[9]
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Maine..........................	173	172	245	34	22	2	34	682
New Hampshire..............	90	92	43	1	19	3	12	260
Vermont.......................	52	64	8	8	18	2	22	174
Massachusetts..............	752	156	32	20	43	10	21	1,034
Rhode Island................	126	20	8	7	8	2	3	174
Connecticut..................	407	109	21	6	4	17	16	580
New York......................	1,503	553	2,547	97	186	15	168	5,069
New Jersey....................	996	123	24	79	78	12	31	1,343
Pennsylvania................	1,300	671	170	899	74	17	191	3,322
Delaware......................	62	30	4	25	17	1	10	149
Maryland......................	321	110	35	58	130	3	41	698
District of Columbia.......	39	--	--	--	--	--	--	39
Northeast..................	5,821	2,100	3,137	1,234	599	84	549	13,524
Michigan.......................	1,133	914	712	290	29	47	344	3,469
Wisconsin......................	742	1,078	19	333	105	14	402	2,693
Minnesota......................	778	900	101	1,700	266	40	498	4,283
Lake States.............	2,653	2,892	832	2,323	400	101	1,244	10,445
Ohio.............................	1,503	548	92	58	90	25	475	2,791
Indiana..........................	583	509	44	34	210	39	384	1,803
Illinois..........................	1,142	1,040	43	104	151	30	473	2,983
Iowa..............................	530	905	31	61	90	16	543	2,176
Missouri.........................	596	649	74	135	273	30	508	2,265
Corn Belt..................	4,354	3,651	284	392	814	140	2,383	12,018

See footnotes at end of table.

TABLE 20.--Land in special-use areas, by regions and States, 50 States, 1959[1]--Continued

State and region	Urban areas[2]	Rural highways, railroads, and airports[3]	Rural parks[4]	Wildlife areas[5]	National defense, flood control, and industrial areas[6]	State-owned institutions and miscellaneous other uses[7]	Farmsteads, farm roads and lanes[8]	Total[9]
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
North Dakota..................	66	932	74	198	480	9	272	2,031
South Dakota..................	87	870	233	69	723	2	231	2,215
Nebraska......................	163	937	32	152	150	11	349	1,794
Kansas........................	299	1,135	91	38	195	16	404	2,178
Northern Plains...........	615	3,874	430	457	1,548	38	1,256	8,218
Virginia......................	551	467	311	73	392	49	167	2,010
West Virginia.................	198	712	41	32	38	28	77	1,126
North Carolina................	596	585	376	254	324	45	239	2,419
Kentucky......................	314	83	81	83	333	28	276	1,198
Tennessee.....................	519	64	387	133	318	70	281	1,772
Appalachian...............	2,178	1,911	1,196	575	1,405	220	1,040	8,525
South Carolina................	362	398	50	152	387	14	108	1,471
Georgia.......................	765	511	76	388	832	17	188	2,777
Florida.......................	1,003	572	997	222	734	183	99	3,810
Alabama.......................	774	549	49	26	203	104	176	1,881
Southeast.................	2,904	2,030	1,172	788	2,156	318	571	9,939
Mississippi...................	301	372	48	123	293	54	268	1,459
Arkansas......................	282	405	20	239	431	2	260	1,639
Louisiana.....................	535	345	12	479	218	15	188	1,792
Delta States..............	1,118	1,122	80	841	942	71	716	4,890

See footnotes at end of table.

TABLE 20.--Land in special-use areas, by regions and States, 50 States, 1959[1]--Continued

State and region	Urban areas[2]	Rural highways, railroads and airports[3]	Rural parks[4]	Wildlife areas[5]	National defense, flood control, and industrial areas[6]	State-owned institutions and miscellaneous other uses[7]	Farmsteads, farm roads and lanes[8]	Total[9]
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Oklahoma	505	609	55	255	567	47	288	2,326
Texas	2,501	1,501	769	283	972	17	735	6,778
Southern Plains	3,006	2,110	824	538	1,539	64	1,023	9,104
Montana	74	728	1,147	383	603	22	142	3,099
Idaho	96	280	97	60	1,011	13	144	1,701
Wyoming	48	523	2,356	74	90	5	56	3,152
Colorado	230	652	564	113	280	16	154	2,009
New Mexico	198	395	253	215	3,142	68	71	4,342
Arizona	312	286	2,752	37	3,629	3	37	7,056
Utah	243	235	320	187	1,814	7	71	2,877
Nevada	53	441	827	252	4,074	3	15	5,665
Mountain	1,254	3,540	8,316	1,321	14,643	137	690	29,901
Washington	489	327	1,297	265	831	13	165	3,387
Oregon	273	398	207	500	173	19	131	1,701
California	2,456	1,174	4,785	153	3,810	31	342	12,751
Pacific	3,218	1,899	6,289	918	4,814	63	638	17,839
Total, 48 States	27,121	25,129	22,560	9,387	28,860	1,236	10,110	124,403
Alaska	21	80	6,910	7,828	2,250	--	1	17,090
Hawaii	75	10	253	1	12	--	25	376
Total, 50 States	27,217	25,219	29,723	17,216	31,122	1,236	10,136	141,869

See footnotes at end of table.

Footnotes for table 20

[1] 50 State totals rounded to nearest 0.1 million acres are shown in table 5.

[2] Areas occupied by towns and cities of 1,000 or more population. Estimates based on areas reported by the Census of Agriculture (16, 1959) and on unpublished measurements made by the Census. Adjustments in census areas were made to exclude large non-built-up areas from urban land. These adjustments were extensive especially in New England where the entire area of many local governmental units, such as towns (townships), were listed as urban by the Census, although containing considerable open space. The 1959 estimates are not exactly comparable with the 1954 and earlier estimates published by the Department of Agriculture because of the changed definition of urbanized areas used in the 1960 Census of Population. Several million additional acres are occupied by rural villages and small towns, with populations below 1,000. This acreage is now included in other major uses of land, such as forest, grazing, farm, and other land.

[3] Estimates of acreage in rural highways were derived by applying average right-of-way widths reported by State highway departments to the mileage in different highway systems reported by the Bureau of Public Roads.

Estimates of acreage in rural railroad rights-of-way are based on State-by-State changes in mileage reported by the Interstate Commerce Commission.

Estimates of acreage in rural airports based on information on airports currently in operation supplied by Federal Aviation Agency. Excludes airports used strictly for personal or military use as such areas are largely duplicated in agricultural and military uses of land respectively. Airports within cities and those surrounded by other built-up areas also were excluded.

[4] Based on data for national and State parks in rural areas supplied by National Park Service. Excludes, in most instances, the areas of bodies of water larger than 40 acres. Includes national recreation areas totaling 2.1 million acres excluded from this category in 1954.

[5] As reported by U. S. Fish and Wildlife Service for Federal and State wildlife areas. Does not include areas under the primary jurisdiction of another agency or land leased for wildlife purposes. Excludes game ranges in Arizona, Montana, and Nevada totaling 4.6 million acres that are reported as grazing land.

State wildlife areas reported in Federal and State Rural Lands (3), plus lands acquired since 1950 by the States for wildlife purposes as reported by the U. S. Fish and Wildlife Service under the Pitman-Robinson and Dingel-Johnson Acts and P.L. 537. Also includes available estimates of areas acquired by the States for wildlife purposes without Federal assistance.

[6] As reported by the Bureau of Land Management (15, 1960). Flood-control lands consisting of 4.8 million acres are administered for flood control and reservoir purposes by the Corps of Civil Engineers. Federal industrial areas of 1.9 million acres chiefly are Atomic Energy Commission lands. National defense land, which is chiefly rural land, totals about 24.5 million acres. Includes limited areas classified as urban or built-up that were not feasible to separate for purposes of this publication.

[7] State-owned rural land held for institutional sites and miscellaneous other uses, such as National Guard camps and rifle ranges, fairgrounds, airports, radio stations, flood-control areas, and watershed-protection areas. Data are incomplete for some States.

[8] Estimates are calculated on basis of State-by-State number of farms and acreage of other land in farms.

[9] The following special uses of rural land are not included: Reservoirs; non-Federal industrial and commercial sites in rural areas; mining areas; clay, sand, and stone quarry sites; powerline rights-of-way; cemeteries; and golf courses.

TABLE 21.--Cropland used for crops, 48 contiguous States, 1909-61

Year	Cropland harvested[1]	Crop failure[2]	Summer fallow[3]	Total cropland used for crops	Index 1947-49=100[4]
	Million acres	Million acres	Million acres	Million acres	
1909	311	9	4	324	86
1910	317	9	4	330	87
1911	322	10	5	337	89
1912	320	12	5	337	89
1913	324	11	5	340	90
1914	326	11	5	342	90
1915	332	11	5	348	92
1916	332	11	5	348	92
1917	341	11	5	357	94
1918	353	12	5	370	98
1919	355	14	5	374	99
1920	351	12	5	368	97
1921	350	12	6	368	97
1922	346	13	6	365	96
1923	345	14	6	365	96
1924	346	13	6	365	96
1925	351	12	7	370	98
1926	350	14	8	372	98
1927	349	15	9	373	98
1928	352	14	10	376	99
1929	356	13	10	379	100
1930	360	11	11	382	101
1931	356	17	11	384	101
1932	361	11	12	384	101
1933	331	33	14	378	100
1934	296	64	15	375	99
1935	336	25	16	377	100
1936	314	43	18	375	99
1937	338	21	20	379	100
1938	340	13	19	372	98
1939	321	21	21	363	96
1940	331	16	21	368	97
1941	335	12	20	367	97
1942	339	11	20	370	98
1943	348	12	17	377	100
1944	353	10	16	379	100
1945	345	9	18	372	98
1946	343	8	18	369	97
1947	346	8	19	373	98
1948	348	9	21	378	100
1949	352	9	26	387	102
1950	337	11	29	377	100
1951	336	17	28	381	101
1952	341	11	28	380	100
1953	341	13	26	380	100
1954[5]	339	13	28	380	100
1955	333	16	29	378	100

See footnotes at end of table.

TABLE 21.--Cropland used for crops, 48 contiguous States, 1909-61--Continued

Year	Cropland harvested[1]	Crop failure[2]	Summer fallow[3]	Total cropland used for crops	Index 1947-49=100[4]
	Million acres	Million acres	Million acres	Million acres	
1956	317	22	30	369	97
1957	316	12	30	358	95
1958	316	9	30	355	94
1959	317	10	31	358	95
1960	317	7	31	355	94
1961[6]	297	12	31	340	90

[1] Includes cropland from which one or more crops were harvested. Acreages are based on the annual estimates of crops harvested by the former Bureau of Agricultural Economics, the Agricultural Marketing Service, and the Statistical Reporting Service. Cropland used for soil-improvement crops that was not harvested or pastured and idle cropland are not included. Acreages in farm gardens, minor crops, and small farm orchards are only partially included in cropland harvested in some years.

[2] Estimates based on acreages reported by the Censuses of Agriculture, (16, 1945-59), and annual estimates of crop losses by the former Bureau of Agricultural Economics, the Agricultural Marketing Service, and the Statistical Reporting Service. Acreage of hayland that produced nothing except pasture in some dry seasons is not included in acreage losses.

[3] Estimates of acreage of fallow were made only for the geographic division west of the Mississippi River. From 1945 to 1948, estimates of fallow were based on acreages seeded to wheat on summer fallow land as estimated by the former Bureau of Agricultural Economics and on data issued by the Great Plains Council. For 1949 and subsequent years, estimates of fallow were based on the Censuses of Agriculture (16, 1950, 1954, 1959); estimates of wheat seeded on summer fallow made by the Agricultural Marketing Service; and data issued annually before 1955 by the Great Plains Council.

[4] Index numbers computed from unrounded data.

[5] Acreages for 1954 to 1960 are based on revised data from the Statistical Reporting Service and the Census of Agriculture (16, 1959).

[6] Preliminary.

TABLE 22.--Crops harvested, 48 contiguous States, 1954 and 1959-61[1]

Item	1954	1959	1960	1961[2]
	Mil. acres	Mil. acres	Mil. acres	Mil. acres
Food crops:				
Food grains:				
Wheat	54.5	51.8	51.9	51.6
Rice	2.5	1.6	1.6	1.6
Rye	1.8	1.5	1.7	1.5
Buckwheat	.1	.1	(3)	(3)
Total food grains	58.8	55.0	55.2	54.7
Irish potatoes	1.4	1.3	1.4	1.5
Sweetpotatoes	.3	.3	.2	.2
Dry beans	1.5	1.5	1.4	1.4
Dry peas	.3	.3	.3	.3
Cowpeas for peas	.3	.2	.1	.1
Sugarcane for sugar and seed	.3	.3	.3	.4
Sugar beets	.9	.9	1.0	1.1
Sugarcane and sorgo sirup	.1	(3)	(3)	(3)
Peanuts for nuts	1.4	1.5	1.4	1.4
Soybeans for beans	17.0	22.6	23.7	27.3
Fruits and planted nuts[4]	4.5	4.6	4.6	4.6
Principal commercial vegetables	3.8	3.4	3.4	3.5
Vegetables for home use[5]	1.6	1.2	1.2	1.2
Total food crops	92.2	93.1	94.2	97.7
Feed crops:				
Feed grains:				
Corn	80.2	81.9	81.0	66.5
Oats	40.6	27.8	26.6	24.1
Barley	13.4	14.9	13.9	13.0
Sorghums, except sirup	18.1	19.0	19.1	14.1
Total feed grains	152.3	143.6	140.6	117.7
All hay:				
Tame	59.6	55.0	55.6	57.0
Wild	12.9	10.8	11.6	10.1
Total hay	72.5	65.8	67.2	67.1
Total feed crops	224.8	209.4	207.8	184.8
Other crops:				
Cotton	19.3	15.1	15.3	15.7
Flaxseed	5.7	2.9	3.3	2.5
Tobacco	1.7	1.2	1.1	1.2
Broomcorn	.3	.2	.1	.1
Sweetclover seed	.3	.1	.1	.1
Timothy seed	.3	.3	.3	.2
Minor crops[6]	2.2	2.0	2.0	2.0
Total other crops	29.8	21.8	22.2	21.8
Total crops harvested[7]	346.8	324.3	324.2	304.3

See footnotes at end of table.

Footnotes for Table 22.

[1] The principal crop acreages harvested are as reported in Crop Production (22,1961); and other crop reports issued in 1960 and 1961 by the Statistical Reporting Service. Acreages of fruits and planted nuts, vegetables for home use, and some minor crops, are based on the Census of Agriculture census reports for 1954 and 1959 (16,1954 and 1959). Acreages for individual crops are rounded to the nearest tenth of a million.

[2] Preliminary.

[3] Less than 50,000 acres.

[4] Includes acreages of tree fruits, small fruits, and planted nuts, as reported by the Censuses of Agriculture (16,1954 and 1959), and estimates of the Farm Economics Division, Economic Research Service, for acreage in orchards having less than 20 fruit or nut trees.

[5] Estimates based on the number of farms reporting vegetables for home use in the 1954 and 1959 Censuses of Agriculture.

[6] Minor crops consist of small acreages of certain vegetables and field crops not included in the 59 principal crops, various legumes, and other crops harvested by livestock, principal crops in minor producing States, and nursery and greenhouse products.

[7] Excludes duplicated acreage in alfalfa, red clover, alsike clover, and lespedeza seeds harvested from hayland, peanut vine hay harvested from land where peanuts were harvested, velvetbeans, and several minor crops.

TABLE 23.--Irrigated land in farms, 31 humid area States, specified years 1949 to 1959

State and region	Irrigated land in farms			Increase or decrease (-), 1949 over 1959
	1959	1954	1949	
	Acres	Acres	Acres	Acres
Maine	2,214	1,097	2,299	-85
New Hampshire	1,249	942	622	627
Vermont	1,612	689	303	1,309
Massachusetts	19,999	22,683	18,507	1,492
Rhode Island	406	1,009	1,631	-1,225
Connecticut	5,171	11,975	8,088	-2,917
New York	57,997	59,024	19,248	38,749
New Jersey	73,873	58,912	28,117	45,756
Pennsylvania	16,523	17,950	7,251	9,272
Delaware	15,533	5,553	404	15,129
Maryland	11,174	8,344	697	10,477
Northeast	205,751	188,178	87,167	118,584
Michigan	40,178	23,473	13,901	26,277
Wisconsin	31,862	18,199	9,781	22,081
Minnesota	14,991	9,207	4,235	10,756
Lake States	87,031	50,879	27,917	59,114
Ohio	11,972	15,379	5,706	6,266
Indiana	17,237	11,738	5,339	11,898
Illinois	10,127	6,789	1,510	8,617
Iowa	18,181	2,396	1,386	16,795
Missouri	29,957	32,998	2,089	27,868
Corn Belt	87,474	69,300	16,030	71,444
Virginia	31,101	21,805	2,817	28,284
West Virginia	1,115	1,381	40	1,075
North Carolina	65,743	25,423	2,083	63,660
Kentucky	8,605	13,434	485	8,120
Tennessee	10,979	22,548	1,012	9,967
Appalachian	117,543	84,591	6,437	111,106
South Carolina	24,952	22,009	6,408	18,544
Georgia	33,700	23,873	3,161	30,539
Florida	413,526	427,807	365,421	48,105
Alabama	17,357	16,658	367	16,990
Southeast	489,535	490,347	375,357	114,178
Mississippi	99,686	132,490	5,086	94,600
Arkansas	711,812	857,863	422,107	289,705
Louisiana	484,850	707,818	576,775	-91,925
Delta States	1,296,348	1,698,171	1,003,968	292,380
Total 31 Eastern States	2,283,682	2,581,466	1,516,876	766,806

Source: Census of Agriculture (16, 1954, 1959).

TABLE 24.--Land irrigated by source of water, 17 Western States, 1959[1] [2]

State and region	Farm sources			Irrigation organizations	Farm and organization sources	Percentage of all land served by ground water[3]
	Ground water	Surface-water	All farm sources			
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	Percent
North Dakota	1	10	11	37	48	3
South Dakota	19	24	43	72	116	16
Nebraska	1,445	99	1,544	534	2,078	70
Kansas	676	35	711	51	762	89
Northern Plains	2,141	168	2,309	694	3,003	71
Oklahoma	148	21	169	29	198	75
Texas	4,615	202	4,817	839	5,656	82
Southern Plains	4,762	224	4,986	867	5,853	82
Montana	31	910	941	934	1,875	2
Idaho	387	327	714	1,862	2,577	18
Wyoming	33	723	757	713	1,470	2
Colorado	496	618	1,114	1,571	2,685	19
New Mexico	439	57	496	236	732	61
Arizona	581	95	676	476	1,152	67
Utah	113	89	202	860	1,062	14
Nevada	101	199	300	243	543	20
Mountain	2,181	3,017	5,199	6,896	12,095	21
Washington	118	144	262	745	1,007	14
Oregon	151	561	713	671	1,384	14
California	3,644	836	4,481	2,915	7,396	53
Pacific	3,914	1,541	5,455	4,331	9,787	44
Total 17 Western States	12,998	4,951	17,949	12,789	30,738	45

Footnotes for table 24.

[1] In the 1959 Census of Agriculture farmers reported the percentage of irrigation water obtained from (1) farm-ground, (2) farm-surface water, and (3) irrigation organization sources. The Census multiplied the percentages for each farm by acres irrigated and totaled the resulting equivalent acreage irrigated from each source.

[2] Because of rounding, figures do not add to totals shown.

[3] Acreages served by organizations were not separated by ground and surface water in preliminary Census reports. In estimating the total acreage served by ground-water sources, it was assumed that the percentage of land served by organizations by ground-water sources was equal the percentage of all water conveyed by organizations from natural sources within each State that originated from ground-water sources.

Source: Census of Agriculture (*16, 1959, vol. 1*) and 1959 Census of Irrigation preliminary State summaries of water conveyed by irrigation organizations.

TABLE 25.--Drained area in drainage projects, 1960, and drainage installed under Agricultural Conservation Program, 1950-59, 48 contiguous States

State and region	Net area drained and used for agriculture, drainage projects, 1960	Total area drained under Agricultural Conservation Programs, 1950-59[1]
	Acres	Acres
Maine	(2)	15,924.
New Hampshire	(2)	4,410
Vermont	(2)	26,646
Massachusetts	(2)	8,552
Rhode Island	(2)	299
Connecticut	(2)	3,781
New York	49,616	155,216
New Jersey	10,956	31,572
Pennsylvania	(2)	141,972
Delaware	340,922	30,320
Maryland	350,447	110,364
Northeast	751,941	529,056
Michigan	9,877,049	1,042,047
Wisconsin	584,093	435,782
Minnesota	10,560,808	1,525,914
Lake States	21,021,950	3,003,743
Ohio	8,809,415	887,151
Indiana	11,053,446	817,426
Illinois	5,563,426	328,113
Iowa	6,871,339	671,167
Missouri	3,097,316	975,700
Corn Belt	35,394,942	3,679,557
North Dakota	1,641,183	665,873
South Dakota	658,580	327,728
Nebraska	739,220	197,201
Kansas	373,110	239,222
Northern Plains	3,412,093	1,430,024
Virginia	92,778	146,206
West Virginia	(2)	19,150
North Carolina	1,320,503	612,302
Kentucky	888,799	170,316
Tennessee	590,879	97,424
Appalachian	2,892,959	1,045,398

See footnotes at end of table.

TABLE 25.--Drained area in drainage projects, 1960, and drainage installed under Agricultural Conservation Program, 1950-59, 48 contiguous States--Continued

State and region	Net area drained and used for agriculture, drainage projects, 1960	Total area drained under Agricultural Conservation Programs, 1950-59[1]
	Acres	Acres
South Carolina	338,066	703,083
Georgia	93,228	70,020
Florida	4,855,327	410,732
Alabama	65,901	193,110
Southeast	5,352,522	1,376,945
Mississippi	3,040,607	1,012,118
Arkansas	4,680,966	1,135,177
Louisiana	7,110,624	1,367,158
Delta States	14,832,197	3,514,453
Oklahoma	133,796	51,879
Texas	5,691,130	314,532
Southern Plains	5,824,926	366,411
Montana	60,112	153,893
Idaho	110,982	132,047
Wyoming	23,833	64,598
Colorado	55,496	108,804
New Mexico	31,593	3,686
Arizona	(2)	(2)
Utah	66,910	44,285
Nevada	41,521	39,412
Mountain	390,447	546,725
Washington	241,182	299,535
Oregon	270,454	379,204
California	1,911,251	777,827
Pacific	2,422,887	1,456,566
United States	92,296,864	16,948,878

[1] Total drainage is sum of enclosed and open drainage, and shaping and grading of land for surface drainage. Drainage under the Agricultural Conservation Program is generally carried out outside active drainage projects.

[2] None reported.

Sources: Census of Agriculture (16, 1959, vol. 4) and Agricultural Stabilization and Conservation Service.

Definitions and Explanations of Land Use Classes

Cropland.--Total cropland available for crops includes cropland used for crops, cropland used only for pasture, cropland in soil-improvement crops, and idle cropland. The acreage of cropland used only for pasture may also be included with the acreage of other pasture or nonforested pasture if the acreage of all improved land used for pasture is desired.

Cropland used for crops is defined as the acreage actually used and in preparation for crops. It is made up of three components--acreage of cropland harvested (land from which one or more crops were harvested), crop failure, and cultivated summer fallow. Certain areas of newly seeded crops and soil-improvement crops not harvested or pastured are not included, as data relating to them are now unavailable. Nor is idle cropland included, as the cropland-used-for-crops series is intended to measure changes in the land area in crops or in preparation for crops the following year.

Idle and fallow cropland and cropland used only for pasture are usually considered in the crop-rotation system as land that is used for crops, though not necessarily in each year. Fallow land often is cultivated to conserve moisture and kill weeds in preparation for crops. Much of the idle land is left unplanted for a year or two only, although some of it is the poorer cropland that represents abandonment for crop purposes.

The series on cropland used for crops is based on the series of principal crops harvested and crop losses of the former Bureau of Agricultural Economics, the Agricultural Marketing Service, and the Statistical Reporting Service, and on data from the Census of Agriculture. The acreages of cropland harvested were used for the censuses taken at 5-year intervals from 1925 to 1959. Interpolations were made for the intervening years, based on the former Bureau of Agricultural Economics series on principal crops harvested. For earlier years, the former Bureau of Agricultural Economics series on principal crops harvested and acreages of specified crops harvested reported by the 10-year censuses were used, and adjustments made for crops not reported. Additions were made to the acreage of cropland harvested reported by the 1950, 1954, and 1959 censuses to cover some of the underenumeration of cropland harvested that was indicated by postenumeration surveys. Before the Agricultural Adjustment Administration program began in 1933, farmers usually thought in terms of "gross areas," which did not allow for land occupied by ditches, fencerows, turnrows, or building sites. In later years, their thinking has been more in terms of "net acres." No doubt this change in method of reporting has affected, to some extent, recent estimates of acreages of individual crops and of total cropland. It has reduced these acreages by an estimated 2 to 3 percent from what they would have been under the definitions of cropland that prevailed before 1933. For an estimate on changes in acreage of cropland in the South, see Langsford (9). This adjustment was necessary in order to account satisfactorily for the total acreage of crops harvested, as reported by the Agricultural Marketing Service and the Statistical Reporting Service.

Acreages of crop failure as given in census reports were used for census years from 1925 to 1945 when reported, and interpolations for intervening years were based on the crop losses or differences between planted and harvested acreages of principal crops as estimated by the former Bureau of Agricultural Economics. Acreages of crop failure for recent years are based chiefly on crop losses as reported by the Agricultural Marketing Service and the Statistical Reporting Service. Reported acreages of crop losses are adjusted for the replanting of part of the acreage on which winter wheat is abandoned. Hayland that produced nothing but pasture in some dry seasons is not included in crop failure in recent years.

Estimates of acreage of cultivated summer fallow were made only for the geographic divisions lying west of the Mississippi River. From 1945 to 1948, estimates of fallow were based chiefly on acreages seeded to wheat on summer fallow land, as estimated in the former Bureau of Agricultural Economics and according to data issued by the Great Plains Council. For 1949 and subsequent years, estimates of fallow were based partly on the 1950, 1954, and 1959 Censuses of Agriculture, estimates of wheat seeded on summer fallow made by the Agricultural Marketing Service, the Statistical Reporting Service, and information obtained from the Great Plains Council. Estimates for years before 1945 were built up from fragmentary data available in the Bureau of Agricultural Economics and the Production Economics Research Branch, Agricultural Research Service.

Pasture and range.--Estimates of the acreage of all pasture and grazing land include open permanent pasture in farms, farm woodland pastured, and all land grazed not in farms. Grazing land not in farms is part grassland, part shrubs and other nonforest growth, and part brushland and woodland.

In the study reported here, pasture and range is classified in two different ways. One breakdown includes grassland pasture and grazing land and woodland and forest pastured or grazed. The second breakdown separates pasture in farms from grazing land not in farms.

Grassland pasture and range.--Grassland pasture and grazing land includes all land used primarily for pasture and grazing, exclusive of the woodland and forest pastured or grazed. It includes the shrub and brushland types of pasture and grazing land such as sagebrush, scattered mesquite, and some other shrub types in the West, and some scattered brushland pasture in the East, and all tame and wild or native grasses and legumes and other forage used for pasture or grazing.

Woodland and forest range.--Only rough approximations can be made of the total acreage of woodland and forest not in farms which contains some areas that have forage subject to grazing or that have value for grazing at some time during the year. Woodland and forest land actually grazed, or useful for grazing, consists principally of open woodland or forest, scattered cleared and cutover areas, abandoned fields, brush-grown pasture, and other land within forested areas that has grass or other forage growth.

In the Northern States, the woodland areas grazed, or subject to grazing, usually include woodland adjacent to farms in the Corn Belt, the Lake States, and the Northeastern States. Much of the forest land in the Missouri Ozark area is subject to grazing. The acreage of woodland grazed in New England and other sections of the Northeast includes abandoned fields and brush-grown pastures.

In the Southern States, the woodland and forest lands estimated to be subject to grazing, or useful for grazing, contain areas covered by switch cane, abandoned fields (not reforested), cutover land, and grass and other forage areas within forests, such as the open longleaf-slash pine belt of the Coastal Plain, the Arkansas Ozark area, and some semiprairie, open grassland, savanna, and marshland areas in Florida, Georgia, Louisiana, and Texas.

The chief woodland and forest areas in the Western States that are subject to or useful for grazing include arid woodlands, brush and shrub lands, woodland-grasslands, open forests, such as the Ponderosa pine forests, and some cutover areas that have grass or other forage growth.

Land use and cover classes of land grazed and in open grassland, shrubs, woodland, and forest are not always mutually exclusive. Grassland includes some brushland, while woodland and forest include many areas of open grass and other forage.

Pasture and range in farms.--Farm pasture consists of open or nonforested pasture, grassland pasture (not cropland and not woodland), and woodland pastured. (Cropland used only for pasture is included as a part of the cropland area in arriving at the total acreage of cropland available for crops.)

Improved pasture ordinarily is in tame grasses and legumes, either seeded or natural growth, but may include native forage. All classes usually have had improvement or conservation practices applied, such as weed and brush control, seeding or reseeding, either artificial or natural, fertilization, drainage and irrigation.

Range not in farms.--Grazing land not in farms comprises the open grassland and shrub grazing lands and the woodland and forest area grazed. Most of the grazing land not in farms is public land in the Western States, and privately owned nonfarm woodlands in the South.

Forest and woodland.--Forest land and woodland as defined by the U. S. Forest Service include (1) lands that are at least 10 percent stocked by trees of any size and capable of producing timber or other wood products, or of influencing the climate or the water regime; (2) land from which the trees described in (1) have been removed to less than 10 percent stocking and which have not been developed for other use; (3) afforested areas; and (4) chaparral areas.

Land that is grazed and that bears sparse forest growth--only 10 to 30 percent covered by trees--or from which the forest has been removed to less than 10-percent stocking but which has not been developed for uses other than timber production, or for pasture, may in some areas overlap the acreages reported by farmers as open pasture and grazing land in farms (grassland pasture, or pasture other than cropland and woodland).

Most of the available forest land in the East, North, and South is commercial, whereas about two-thirds of such forest land in the Great Plains and half of that in the West is classed as noncommercial woodland. Noncommercial woodland includes inaccessible alpine ranges, chaparral, mesquite, pinon-juniper, and semiarid shrub end brush growth.

Special-use areas.--The specified special uses in this report include those for highways, roads, and railroad rights-of-way, airports, farmsteads, and farm roads and lanes, urban and town areas; parks; wildlife refuges, national defense areas, flood-control areas; and State-owned land held for institutional sites and miscellaneous other uses, such as National Guard Corps and rifle ranges, fairgrounds, airports, radio stations, flood-control areas, and watershed-protection areas.

Special uses of rural land for which estimates are not available include those for industrial and commercial sites in rural areas, mining areas, clay, sand, and stone quarry sites, powerline rights-of-way, cemeteries, and golf courses.

Areas in rural villages and small towns with populations of 100 to 1,000 are not included in urban and town areas. At present, the acreage in these villages and towns is included in other major uses of land such as forest, grazing, farm, and other land. Separation would call for revision of accepted major land use areas of many counties and States.

Water area in large reservoirs is not included among the special uses of land as the approximate land area of the United States excludes all natural or artificial water bodies of 40 acres or more.

Miscellaneous other areas.--Miscellaneous unaccounted-for areas not found among other major uses include marshes, sand dunes, bare rock areas, and deserts.

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